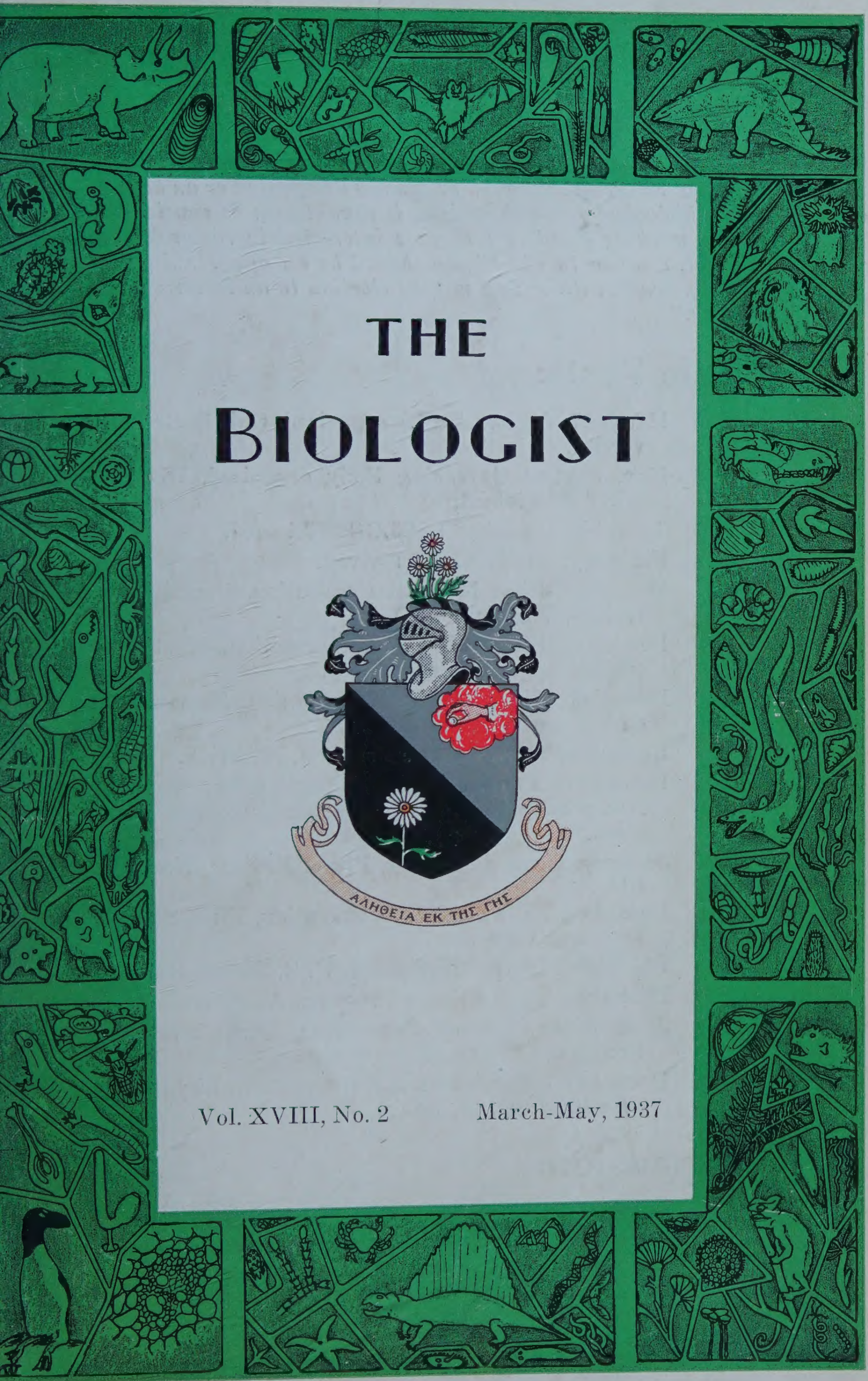

THE BIOLOGIST

Vol. XVIII, No. 2 March-May, 1937

PHI SIGMA
BIOLOGICAL HONOR SOCIETY

"The object of Phi Sigma is to promote interest in biological research. Although originally designated as an honorary biological research society, it should now be considered as a working guild of biologists interested in research. In effect, election to Phi Sigma should be an opportunity for better work, rather than merely election to an honorary society."

Mile Posts:

1915	March 17, Alpha Chapter organized, Ohio State University.
1916	May, Central Governing Body organized, BIOLOGIST first issued.
1917	June, last War-time BIOLOGIST issued.
1921	February, BIOLOGIST revived.
1924	December, First National Convention, Constitution revised, Washington, D. C.
1925	December, Second National Convention, First Scientific Program, Kansas City.
1926	December, Third National Convention, Second Science Program, Philadelphia.
1927	December, Third Science Program, Nashville.
1928	December, Fourth National Convention, Coat-of-Arms adopted, Fourth Science Program, New York.
1930	January, Council Meeting, Ritual Revised, Norman, Okla.
	December, Fifth National Convention, Fifth Science Program, Cleveland.
1931	Phi Sigma Letters Registered, U. S. Patent Office.
1932	December, Sixth Science Program, Atlantic City.
1933	June, Sixth National Convention, Seventh Science Program, Chicago.
1935	December, Seventh National Convention, Eighth Science Program, St. Louis.

Expansion:

The Constitution provides that: "An active chapter may be established in any institution of learning which requires for graduation the equivalent of four years of collegiate work, and which is equipped with facilities for research work. - - - - Any petitioning group must be active for at least one year before it may be granted a charter."

THE BIOLOGIST

Vol. XVIII Denver, Colo., March-May, 1937 No. 2

Copyright 1936 by the Phi Sigma Society, an organization devoted to the promotion of interest in biological research, founded at Ohio State University, March 17, 1915. The Biologist is the official quarterly publication of the society, issued ordinarily in October, December, March and May, as a medium of exchange between chapters, as an interpreter of Council policies, and as a stimulus to the fellowship in science for which Phi Sigma stands.

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DIRECTORY

OF ALL ACTIVE AND INACTIVE CHAPTERS

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ALPHA

Ohio State University, Columbus, Ohio, founded March 17, 1915, (Inactive).

BETA

University of Michigan, Ann Arbor, Michigan, founded June 3, 1916.

DELTA

University of Maine, Orono, Maine, founded January 27, 1917.

EPSILON

University of Denver, Denver, Colorado, founded March 5, 1917.

ZETA

University of Wisconsin, Madison, Wisconsin, founded May 30, 1917.

ETA

University of Akron, Akron, Ohio, founded April 20, 1921.

THETA

Michigan State College, East Lansing, Michigan, founded April 9, 1921.

IOTA

Washington University, St. Louis, Missouri, founded May 28, 1921.

KAPPA

University of Kansas, Lawrence, Kansas, founded May 31, 1921.

LAMBDA

University of Montana, Missoula, Montana, founded May 4, 1921.

MU

University of California, Berkeley, California, founded April 27, 1922.

NU

Washington and Jefferson College, Washington, Pennsylvania, founded May 11, 1922.

XI

University of Nebraska, Lincoln, Nebraska, founded May 3, 1934.

OMICRON

University of North Dakota, Grand Forks, North Dakota, founded May 26, 1924, (Inactive).

PI

Emory University, Georgia, founded January 3, 1925.

RHO

University of Illinois, Urbana, Illinois, founded March 28, 1925.

SIGMA

University of Florida, Gainesville, Florida, founded December 4, 1925.

TAU

Duke University, Durham, North Carolina, founded March 4, 1926.

UPSILON

Miami University, Oxford, Ohio, founded May 7. 1926.

PHI

University of New Hampshire, Durham, New Hampshire, founded May 21, 1926.

CHI

Montana State College, Bozeman, Montana, founded February 11, 1927.

PSI

University of Washington, Seattle, Washington, founded April 7, 1928.

OMEGA

University of Oklahoma, Norman, Oklahoma, founded March 24, 1928.

ALPHA ALPHA

University of Southern California, Los Angeles, California, founded May 17, 1930.

ALPHA BETA

Mount Union College, Alliance. Ohio, founded May 17, 1928.

ALPHA GAMMA

University of South Dakota, Vermillion, South Dakota, founded May 15, 1928, (Inactive).

ALPHA DELTA

Lawrence College, Appleton, Wisconsin, founded March 7, 1929.

ALPHA EPSILON

University of Pittsburgh, Pittsburgh, Pennsylvania, founded March 23, 1929.

ALPHA ZETA

College of William and Mary, Williamsburg, Virginia, founded April 19, 1930.

ALPHA ETA

Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma, founded March 13, 1930.

ALPHA THETA

State College of Washington, Pullman, Washington, founded May, 1930.

ALPHA IOTA

Bucknell University, Lewisburg, Pennsylvania, founded January 9, 1932.

ALPHA KAPPA

Hunter College, New York City, founded January 8, 1932.

ALPHA LAMBDA

University of Utah, Salt Lake City, Utah, founded February 13, 1932.

ALPHA MU

University and State Agricultural College of Oregon, Eugene-Corvallis, Oregon, founded November 18, 1933.

ALPHA NU

University of New Mexico, Albuquerque, New Mexico, founded April 21, 1935.

ALPHA XI

Rhode Island State College, Kingston, Rhode Island, founded May 17, 1935.

The Eighth National Convention

The 1937 National Convention will be held next winter at Christmas time. It may seem very premature to announce this important event this early but the more thought that can be given to the matter by the chapters the better will the Convention be.

Without doubt many important subjects will be brought up for consideration by the chapters' delegates. As many chapters meet only once a month it is advisable that the convention be given serious thought early next fall. The following brief outline at this time will give a general idea of plans.

The Conventions of Phi Sigma are normally held every two years at the same time and place as the winter meetings of the American Association for the Advancement of Science. Our last Convention was at St. Louis in December, 1935. The latest information indicates that the 1937 A. A. A. S. meeting will be at Indianapolis.

For the past several years, our Conventions have consisted of two parts—business sessions and scientific sessions. In addition a banquet is given for the delegates and the many others interested, at which time a biologist of national prominence speaks.

Each chapter is entitled to one voting delegate. It is not too early to think about this. The delegate's railroad fare is paid by the National Treasurer, but he or the chapter must bear the other small expenses.

Each chapter is requested to send in to this office as soon as convenient a list of any and all subjects which it wishes brought up on the floor of the Convention.

The scientific sessions are reserved for the presentation and discussion of papers by members present. These papers should be read by the writer or at least by one who has had a part in the preparation.

Because of the importance of the business and scientific sessions, you should send as your delegate a person who is thoroughly acquainted with the affairs of Phi Sigma, familiar with the work and desires of your chapter, and one who can most effectively present the viewpoint of your chapter to the Convention. In addition he should be a person whom you can trust to vote with good judgment on any matters which come before the Convention, and one if possible who has done enough scientific research to have a worth while paper to present. Admittedly this is a great deal to expect of a single individual but each chapter usually has some members of sufficient caliber to qualify.

The National Convention is of the greatest importance for the simple reason that it is *national*. It is at this time that matters affecting the entire national organization are considered and settled. In addition the national reputation of our Society is either strengthened or weakened by our scientific programs. Details will be sent each chapter secretary early next fall and will also appear in the fall issue of the *Biologist*.

Think about these things. Have ideas. Offer suggestions *freely* to your National Secretary. Make our eighth National Convention the success it should be.

A. I. Ortenburger,
National Secretary.

BIOLOGICAL SUMMER CAMPS, COURSES, LABORATORIES and SCHOOLS

CALIFORNIA

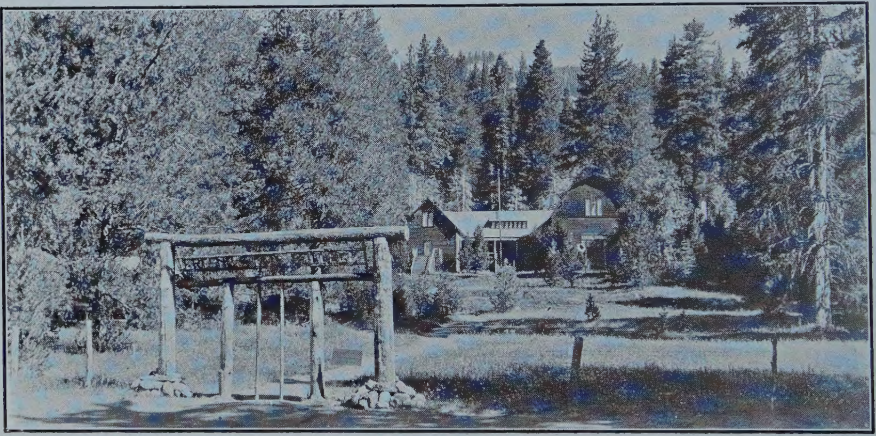
Fresno

THE SIERRA SUMMER SCHOOL

by

DR. LEO F. HADSALL

THE Sierra Summer School of the Fresno State College is located on the western slope of the Sierra Nevada Mountains in central California at an elevation of 7,000 feet. It is readily accessible by stage or car over improved mountain roads at a distance of seventy miles from Fresno. Fresno is approximately the geographical center of California.



Entrance to Campus at Huntington Lake, Sierra Summer School.

The campus occupies a gently sloping hillside bordering Huntington Lake. Fine buildings have been erected for the students' use but the natural setting has not been greatly altered. Huge pine and fir trees remain on the campus, campgrounds and surrounding area. A lighter touch is added by delightful groves of trembling aspens. Throughout the summer the floor of the campus is carpeted with a delightful succession of attractive wild flowers. The science staff and students cooperate in maintaining flower tables on which carefully identified species are exhibited during the session. During the 1936 session as many as 250 different species were on exhibit over a single period. Among these were the fragrant western azalea and the attractive Sierra rein orchis, mountain bluebells, brodiaes, Mariposa lilies, pink mimulus, penstemons and scarlet gilia. Such species as the red heather, sub-alpine buttercups and Sierra primrose were collected from higher altitudes for these exhibits. Since the campus proper is located within a forest reserve the wild life may be observed under decidedly natural conditions. Numerous forms of wild mammals and birds are frequent visitors to the outdoor classes. Friendly chipmunks and hummingbirds are daily visitors. Deer are frequently seen in the area adjoining the campus.

Petticoat Lane: The Women's Campus.

The 1937 session opens June 26th and closes August 6th. Classes are conducted daily, Monday to Friday inclusive, and Saturdays are given over to student affairs and carefully guided field trips. There is usually a choice of excursions, varying in length and difficulty, to satisfy those less skilled in mountain hiking as well as the more ambitious. One of these excursions will be made by car to the McKinley Grove of Big Trees, Sequoia gigantea, a distance of approximately thirty miles. One of the special features of each session is a three-day pack trip into the back country. This trip is not a required part of the work but is open to all students registered and to members of their immediate families. The size of the group participating in this activity enables the management to conduct it at the rate of $3.50 per person for the three days including meals. Improved roads lead from the campus up to altitudes of 9,000 feet so that the back country is readily accessible.

One of the outdoor classrooms.

The science offerings for the 1937 summer session will include courses in Taxonomy and Field Botany, Elementary Botany, Nature Study, Field Natural History of Vertebrates and Biological Problems. A considerable portion of the time will be spent in field work. Early morning field trips are in order for those especially interested in bird life. The wild life in this area is very similar to that of the Yosemite with the added attraction that it remains more natural having escaped the unnaturalizing effects of crowds. Although science students are especially encouraged to take advantage of first hand study of the natural life in this area, a generous supply of carefully selected references is provided in a commodious library with a large reading room where a cheery fire in a great rustic fireplace adds comfort and enjoyment on cool evenings.

Upper: Lunch and discussion of the Natural History of the area.

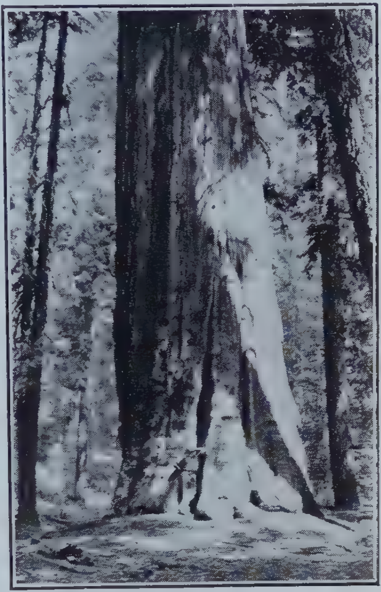
Lower: Saturday hike to Twin Lakes, typical of the countless small lakes in the High Sierras.

In addition to the science offerings a wide range of instruction is given in art, education, English, mathematics, music and the social sciences. A complete list of the offerings may be obtained by addressing Dr. Mitchell P. Briggs, Director of the Sierra Summer Session, Fresno State College, Fresno, California, prior to June 15th. Communications later in June should be addressed to Lakeshore, California.

The total expenses of a six weeks stay at the summer session, including registration fees, board, living quarters, textbooks and incidentals ranges from $50 to $100. Pleasant climatic conditions prevail throughout the summer session. Storms rarely occur between the middle of June and the middle of August. Many of the students camp on the free college campground or the Forest Service campgrounds nearby. Cottage tents or cabins are available for those who do not prefer camping. Many students who bring their own camp equipment and pitch their tents in the well-kept campgrounds, supplied with water and other conveniences, may actually enjoy a summer of professional development and recreation for as little as $35. A survey of living costs during the 1935 session showed that more than half the students were able to keep all their summer expenses at the school between $50 and $55. This did not include transportation to and from the Lake or the simple mountain clothes which constitute the major portion of a student's wardrobe.

Ample provision is made for recreation. The Lake is ideal for swimming. Lectures on natural history and current topics are held regularly each week. Members of the student body are selected to organize and conduct a school paper, athletic contests and weekly socials and dances.

Students from other states find pleasure in combining a summer of study in the Sierras with visits to the finest of the Big Tree areas in Sequoia, General Grant and Yosemite National Parks. All of these parks are within a few hours drive from Fresno and are accessible by automobile or stage over highly improved roads.



The Dinkey Grove of Big Trees (*Sequoia gigantea*) near Huntington Lake.

Huntington Lake.

Laguna Beach

POMONA COLLEGE SUMMER SCHOOL

by

DR. WILLIAM A. HILTON

FOR more than twenty-five years work has been in progress in the Laguna Marine Laboratory of Pomona College. In this time hundreds of students and investigators have made use of the opportunities for study and research. In all these years classes have been conducted along biological lines. There have been courses for beginners as well as for the more advanced. Here is one of the few places where younger and older students are associated in a common work with advantages to both. The younger obtain inspiration from the older, more experienced; it may be that his eyes are here first opened to a new world of life. The older in turn gains from the younger a freshness of viewpoint, and eager interest which is also a stimulus.

For the middle westerner or others who have not had the opportunity for ocean study, the life here has often been a great experience. Every biologist should spend at least one season at the ocean for general culture; others also have greatly benefited.

The locality is naturally a rich one with miles of rocky coast and mud flats not very far away. The waters are warm and there is a great abundance and variety of marine forms. Not only are the large animal groups well represented, but many rarer forms have been found such as phoronids, pycnogonids, archiannelids, Balanoglossus, and Amphioxus.

The study is often very informal and field work is stressed. In the building besides general laboratories there are a number of private rooms. Students and teachers are not alone from Pomona and the associated institutions, but also from many more distant colleges and universities, from this country and abroad.

Over a quarter of a century ago a small group of students with their teachers spent a summer at the once sleepy little village of Laguna Beach ten miles from the nearest city. All joined in the energetic hunt for specimens. Year by year groups have continued this search. In the early days there were cooperative housekeeping arrangements. At first a small group of us hired several old cottages and these, before the laboratory was finished, were living quarters and work rooms. The kitchen stove in one place served for laboratory shelves and aquarium jars with specimens rested on the porch and in the yard. In those days as in the years that followed, the early morning trips, adventures in animal distribution, gave us year by year a better knowledge of our local environment. Each year some rare specimen was seen that we had not found before. The coves, the bays for miles up and down the coast were explored and hardly a stone was left unturned. In addition to the many early morning excursions there were day trips when faculty and students came in contact with the abundant life of the ocean. As the years passed, our numbers grew, suddenly to become less during the war period, and since then to increase once more. In every case the group has not been large, not too large for social recreation in the way of excursions, beach suppers, or other activities. Along with the years the village has grown with more of the facilities of civilization. Yet with it all we have kept our informality; the laboratory is still a field station.

For six weeks or more each summer we are busy; there is no idle moment. In this time it is possible for even the beginner to learn more of animals and their distribution than is usually gained in a much longer period inland. Our building is merely a field station and the ocean itself is our laboratory. The low tide periods are utilized to their fullest and the indoor time is spent in various phases of biological work. Many papers have been published from work done or started here and many new forms have been described from these waters.

The environment is a pleasant one. The clear waters of the ocean bathe a rocky but cold shallow bay. A rugged shore line makes for a variety of scenery. There are acres of sea anemones exposed at low tide, tons of marine worms, many crustaceans in water and land. Many beautiful pools lined with algae seem as natural aquaria for changing tenants. Giant crabs occupy the deeper waters, sand dollars and sand hydroids strew the mud flats. The ocean breaks on high muscle-covered points with their associated forms. Some animals are very abundant, but one of the characteristics of the region is the great variety found from place to place and from season to season. If one passes a summer here, he is prepared to appreciate something of the wealth, beauty and variety of animal life and be able to understand much of the marine life in other parts of the world.

La Jolla

SCRIPPS INSTITUTION OF OCEANOGRAPHY

by

DR. CLAUDE E. ZOBELL

THE Scripps Institution of Oceanography is a branch of the University of California which is concerned primarily with investigating the "other two-thirds of the world''; the ocean, its inhabitants, its constituents and its relation to man. The campus comprises a 177 acre ''pueblo lot'' located on the ocean front two miles north of La Jolla and sixteen miles from downtown San Diego. Its isolation from populous centers, freedom from terrestrial drainage except during the brief rainy season, the proximity of deep water and the oceanic circulation insure conditions which are typical of sea.

From an inauspicious beginning in 1892 when members of the Zoology Department of the University established a laboratory for marine naturalists in a portable tent-house at Pacific Grove, the Institution has grown into one of the most important of its kind in the world. In 1893 the laboratory was re-erected on Santa Catalina Island and in 1895 at San Pedro. From 1896-1901 the work was continued as collecting and reconnoitering expeditions by University staff members from Alaska to San Diego. In 1901 working quarters were established in a bath-house at San Pedro for research and teaching purposes and since that time the University has always had a seaside laboratory.

In 1903 the itinerant equipment was moved to Coronado where the organization was incorporated as the Marine Biological Association of San Diego with Prof. W. E. Ritter as the director. It was at this time that Miss Ellen B. Scripps and Mr. E. W. Scripps became actively interested in marine investigations. In 1907 they financed the construction of a spacious but temporary laboratory building in La Jolla on the present park site. Later they provided funds for the George H. Scripps Memorial Laboratory, the first permanent building at the present location of the Institution in 1910. Since this time members of the Scripps family have contributed generously to the support of the activities and capital improvements of the Institution.

In 1912 the organization was officially turned over to the University of California and its name was changed to the Scripps Institution for Biological Research of the University of California. Dr. Ritter served as director until 1924 when Dr. T. Wayland Vaughan was appointed. Prior to this time the scope of the work had increased to include in addition to the study of marine organisms also the study of the physical and chemical factors which influence their distribution and activities. Thus by 1924 hydrography, physical oceanography, meteorology and the chemistry of sea water were receiving the attention of specialists who had been added to the staff along with the biologists. Therefore it seemed appropriate that the administrative officers and Regents of the University change the name from the Scripps Institution for Biological Research to the Scripps Institution of Oceanography.

Upon his appointment to the directorship, Dr. Vaughan initiated an even more extensive program for oceanographic research. He added marine geology as another field of study and provided for further biological specialization by the appointment of a bacteriologist to investigate the role of microorganisms in chemical, biological and geological transformations in the sea and a physiologist to study the biochemical activities of marine organisms and their adaptation to their environments.

Throughout his administration Dr. Vaughan emphasized the importance of cooperative investigations on the interrelationships between the physical, chemical, biological and geological phenomena in the sea as exemplified by his "The Oceanographic Point of View"[1]; "Present trends in the investigation of the relations of marine organisms to their environment"[2] and other publications. Sensing the inadequacy of the Institution's small staff to gain a complete understanding of the Pacific Ocean, Dr. Vaughan successfully solicited the cooperation of additional contributing agencies including several other institutions and nations bordering the Pacific, the U. S. Navy Department, various fishery commissions, the Coast and Geodetic Survey, the Coast Guard, the Weather Bureau and various navigation companies. Thus there have been initiated several cooperative projects of international extent for systematically studying the world's largest but least understood ocean. Another notable achievement has been the acquisition of additional buildings, apparatus, a salt water system and much scientific literature and other improvements of the Institution research facilities.

At the present time the physical properties of the Institution include three modern well-equipped research buildings divided into 38 rooms and offices. The library contains over 14,600 bound volumes, 1100 charts and 30,000 pamphlets. It subscribes to 74 periodicals and receives 236 others on an exchange basis besides 18 periodicals which are presented as gifts. The pier extends 1000 feet from shore. On the end of it is located two work rooms, row boats, the outboard motor boats, collecting devices, various observational apparatus including the automatic tide gauge of the U. S. Coast and Geodetic Survey and the pump which supplies the buildings with a continual supply of salt water. The public aquarium which exhibits local fauna in its nineteen tanks and the museum serve an important educational purpose for the thousands who visit them annually. Many forms of plant and animal life besides special projects in physical oceanography, marine geology and other marine sciences are on display in the museum. Cottages located on the campus provide living accommodations for most of the staff members and a few visitors. The boat SCRIPPS, the unique floating laboratory of the University was destroyed by a fire and explosion on November 13. While its loss temporarily handicaps the research program, the spirit of progress will not be daunted by this misfortune. Plans are already under way to provide for a bigger and better boat for oceanic expeditions.

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[1] Contr. to Marine Biology, Stanford University Press, 44-56 (1930).
[2] Ecological Monographs 4:501-522 (1934).

It is the expressed policy of Dr. Harald U. Sverdrup, who became the director of the Institution in September 1936, to maintain the present projects and to extend the research program further towards the deep sea. Conditions in the deep sea at places remote from land have a marked influence upon conditions near shore as well as upon the world above sea level. Prerequisite to an understanding of the character of coastal waters, their physical and chemical properties and their function as an environment of marine life is knowledge of conditions in the more distant deep-sea regions. It is hoped that such observations including a systematic investigation of the cold California Current and the warmer water masses to the south will constitute an important contribution to the science of the sea and may also prove to be of value in fishery problems and in weather forecasting.

Already Director Sverdrup has exerted a marked unifying and stimulating influence which clearly indicates that the S. I. O. research program is to be continued on an even more intensive and extensive basis. He has achieved international recognition as an oceanographer, meteorologist and polar explorer. His broad interest in all the marine sciences, his familiarity with the problems confronting the oceanographer and sympathetic understanding of human nature plus his proven inspirational leadership are characteristics which admirably equip him for this work.

In order to increase the usefulness of its instructional facilities Director Sverdrup has re-organized the educational program of the Institution. Through a cooperative arrangement with certain departments of the University of California at Berkeley and Los Angeles, the Institution offers graduate work leading to the M.S. or Ph.D. degree in oceanography and other fields of study related to the marine sciences. Only a limited number of superior students who are well prepared in the fundamentals are admitted. Beginning June 28, 1937, a comprehensive upper-division course entitled Introduction to Oceanography will be offered at La Jolla for the purpose of training prospective research workers for a career in oceanography and especially to familiarize students with the science of the sea and its relation to man. This course is a descriptive study of the general field of oceanography including the historical, physical, chemical and biological aspects. Its duration is six weeks. Instruction will consist of lecture, library, laboratory and field work.

During the summer sessions courses entitled Special Study in Oceanography will be available to advanced undergraduate and qualified graduate students by special arrangement with the head of the division in which the work is to be done. The fields of study include physical oceanography, chemistry of sea water, phytoplankton, zooplankton, physiology of marine organisms, marine microbiology, marine meteorology, ecology of marine organisms, marine invertebrates and fish biology. Graduate work in these fields of study will likewise be offered during the same period. All of the courses except the introductory one are available throughout the year. Prospective students are advised to write to the Director of the Institution for further details.

Experienced investigators who wish to utilize the research facilities of the Institution are especially welcome. Opportunities will be found for the study of a wide variety of marine sciences including problems in marine zoology, botany, bacteriology, chemistry and geology. Investigators and students who contemplate work at the Institution should correspond with the Director before deciding to come to La Jolla.

There is a wealth of biological material in the vicinity. Representatives of nearly all groups of marine organisms can be found either along the coast, in the adjacent ocean waters, nearby Mission and San Diego bays or at collecting grounds which are readily accessible by automobile. An excellent salt-water supply system provides for culture studies and other kinds of experimental investigations. The laboratories are equipped with adequate incubators, constant temperature rooms, analytical apparatus, special instruments, collecting devices, photographic equipment, and other supplies to provide for many types of work in biology, chemistry or physics. Most of the laboratories are supplied with running salt and fresh water, compressed air, negative pressure, gas and electricity.

Why study the sea? The objectives are both utilitarian and academic. Although the Scripps Institution has engaged primarily in research in pure science, the knowledge gained by this approach frequently contributes to the solution of economic problems.

The broad scope of the research program at the Institution may be judged by the following summary of the principal projects of the staff members. Besides his administrative duties Director Sverdrup is studying oceanic circulation and perfecting instruments for making such observations. Associated with him is Dr. Richard H. Fleming who is primarily interested in the physical, chemical and dynamical properties of the sea. Dr. George F. McEwen continues his work on the application of mathematics to oceanographic phenomena including its physical, chemical, dynamical and biological aspects. He takes an active part in beach conservation work particularly as affected by wave and current action. His annual weather forecasts based upon oceanographic data have given the Institution considerable recognition.

Dr. F. B. Sumner is investigating the physiological factors which influence the adaptation of marine fishes to different environmental conditions. Optic stimuli and temperature changes are receiving special attention at this time. In the physiological laboratories, Dr. D. L. Fox is pursuing studies on the carotenoid pigments of marine organisms as well as investigating various biochemical activities of marine animals which influence conditions in the sea.

Prof. W. E. Allen has collected continuous records of the phytoplankton content of the water for nearly twenty years and he is attempting to correlate the abundance of these microscopic plants with the general productivity of the sea as influenced by nutrients, temperature, insolation and other physico-chemical conditions. He takes an active interest in coordinating the "anti-fouling" work at the Institution with that of the U. S. Navy. Dr. E. E. Cupp is analyzing her taxonomic data on the diatoms of different regions in the Pacific from Alaska to Panama and perfecting methods for studying their distribution.

Dr. E. G. Moberg has had charge of the work at sea on the boat SCRIPPS and in addition he has been directing the work of several assistants in analyzing sea water for various chemical constituents which are of biological, geological or oceanographic significance. Dr. R. R. Revelle has been investigating the geological properties of recent sediments. He is continuing his researches in Europe this year.

During the last three years Dr. R. T. Young, a visiting scientist, has made many important contributions to the biology of life and death. He has also studied the parasites of many fishes and birds. Mr. La Place Bostwick, a special resident investigator, continues to perfect his technique for the cultivation of pearls in abalones under laboratory conditions. His book on this subject is now in press. Mr. Percy S. Barnhart, curator of the aquarium and museum, is the author of the book on "Marine Fishes of Southern California" illustrated by 292 figures which has just been published by the University press.

Dr. Martin W. Johnson, who has recently taken charge of the zooplankton work, is studying the distribution and life cycles of various marine invertebrates including *Limnoria*, a wood-borer of economic importance and certain pelagic and littoral copepods of oceanographic significance. Dr. Claude E. ZoBell is investigating the factors which influence the distribution of bacteria and closely related microorganisms in the sea and their role in activating chemical, geological and biological transformations.

The staff members and visiting scientists together with their respective assistants are working on numerous projects besides the general fields of study mentioned above. Some of the research projects require the joint efforts of two or even several of the staff members and some projects are being worked on cooperatively by scientists in other educational institutions and government agencies. All of the work at the S. I. O. has one common objective; namely, to acquire knowledge of the sea, its phenomena, its inhabitants and its relation to human life. While the staff and research facilities are dreadfully inadequate for the stupendous task, by the intelligent direction of forces much progress is being made which fittingly makes the University of California a leader in the study of the ''other two-thirds of the world'' as it is in the study of so many terrestrial sciences.

Actually 71 per cent of the surface of the earth is covered with water. The average elevation of the land above sea level is about 2,000 feet whereas the average depth of the ocean is over 10,000 feet below sea level. If Mt. Everest, the highest peak on the earth, were placed in the Ramapo deep, the lowest depression in the earth's crust yet sounded, the former would be covered with nearly a mile of water. If all of the inequalities of land and sea were smoothed out to a perfect spheroid, the entire surface of the resulting earth would be covered with water to a depth of over a mile. Will this ever occur due to the forces of erosion which are continually tending to level the surface of the earth?

This great expanse of water is important for many more reasons than navigation, fisheries and as a bathing resort. The sea contains a vast wealth of natural resources. We do not emphasize the fact that the oceans of the world contain enough gold in solution to make every one of the two billion inhabitants of the earth many times over a millionaire even at pre-inflation prices because the gold cannot be profitably extracted at the present time. However, the sea now supplies man with most of his bromine, potassium and iodine needs, not to mention the common table salt. California alone contributes over 2,000,000 barrels of salt per year, most of this being reclaimed from sea water at San Francisco and San Diego. There is enough of this commodity in the Pacific ocean alone to cover the continental United States to the depth of nearly a mile. Other valuable mineral salts occur in the sea. In fact, every known mineral and element is found in the sea, many in commercially valuable quantities.

All evidence indicates that our present petroleum fields are of marine origin. By studying past and present seas, information is gained concerning the conditions under which petroleum is formed and thereby materially aids the petroleum geologist in locating present fields. Such studies have received special attention at S. I. O. to the mutual advantage of our graduates and the oil companies.

The greatest wealth in the sea, however, is not its gold, silver or mineral content but its natural productivity. Besides containing twice as many representatives of nearly every major animal group excepting insects as the earth above sea level, the ocean is also the native habitat of many plants. While most of the marine plants are microscopic in size, some of the giant kelps of the Pacific exceed California's redwoods in height.

It is the tiny diatoms, dinoflagellates, algae and other microscopic plants which constitute the basic food supply for the extensive animal population of the sea. These passively drifting plants are called phytoplankton and they make up the so-called ''ocean pasturage''. The study of the factors which influence the growth and distribution of ''ocean pasturage'' receives considerable attention at S. I. O. because it is basic to the productivity of the sea.

It is claimed by some oceanographers that acre for acre the ocean is more productive of both plant and animal life the world over than the land. Merely harvesting these raw products from the sea gave employment to over 12,000,000 men in civilized countries in 1928 when the value of marine products of commerce exceeded $17,000,000,000. In the countries from which statistics were available in 1932, the value of raw fish which are used as food, oils, fertilizer, soap, glue and leather exceeded $13,208,000,000. Shellfish including oysters, clams, scallops, abalone and mussels sold for $1,740,000,000. Crabs, shrimps and lobsters sold for $695,000,000. Pearls, precious corals, mother-of-pearl and other ornaments from the sea were valued at $156,000,000. Sponges harvested in 1932, many of which are cultivated along the Mediterranean coast, Key West and elsewhere, were worth $9,000,000. However, unless these lucrative industries are scientifically safeguarded, there is a great possibility of their suffering the same fate due to ''overfishing'' as whaling.

So far little attention has been given to the conservation of marine resources although aquiculture is practiced along the sea-coasts of many nations, notably Holland, Belgium, France and Japan. Blessed with an abundance of natural terrestrial resources such as great forests, almost unlimited mineral wealth and vast acreages of tillable land, our own country has taken little advantage of the marine resources, has done little to protect them and virtually nothing to develop them. While it is difficult for one to visualize water farms, aquiculture is just as susceptible to scientific treatment as agriculture. In the sea there is no drought, the temperature is even throughout the year, and there are plenty of all salts except nitrates, phosphates and silicates which sometimes become a limiting factor for plant growth. Such talk is not popular in our country during these days of overproduction of agricultural commodities, but with over 20 per cent of our tillable land already permanently destroyed by erosion and faulty farming procedures and with the constant menace of drought along with the increasing population, it may some day become necessary to look toward the sea for food.

There are no less than 70 different species of marine plants which are harvested and consumed as food in Hawaii. The Japanese make extensive use of 26 different species of edible marine plants. Dishes prepared from plants which grow in the sea the world over constitute some of the choicest delicacies. A few which are most commonly utilized are Irish moss, agar-agar, green laver, pink laver, dulse, seatron, kombu, fat choy, amanori, awo-nori, kijiki, arame, murlins and limu kohu.

Someday it may become necessary and feasible to render sea water fresh so that it can be used for irrigation. The foresighted diversion of the Colorado river, the last important source of water for Southern California, has made provisions only for the next hundred years at the present rate of population increase. Future expansion may depend upon the utilization of freshened sea water. This is already being done experimentally in certain parts of the world. When harnessed, waves, tides and thermal differences could provide the motive power for pumping and purifying sea water.

The ocean also presents certain problems. The erosive actions of waves is constantly cutting away the land. Uncontrolled, this encroachment of the sea upon the land amounts to a fraction of an inch to several feet per year. Unless prevented by the application of scientific principles, ocean currents have a tendency to silt up bays and harbors and to denude beaches of their beauty and usefulness as bathing resorts. The problem of the conservation of beaches is receiving especial attention at S. I. O.

Marine wood-borers of various kinds rapidly destroy unprotected submerged structures such as piles, wharves and boat bottoms. Barnacles and other fouling organisms attach in such great abundance that ocean-going vessels must be dry-docked frequently to scrape off this inimical cumulation. The harmful activities of these organisms can be prevented only by acquiring more information regarding their habits.

These and many other problems are receiving attention either directly or indirectly by the S. I. O. investigators. The commercial applications are not especially stressed as they seek for truths concerning the sea but such applications become obvious as the work proceeds. The investigators at S. I. O. regard the ocean as an unconquered wilderness. There may be no new lands to be discovered but the adventure of discovering ways and means of utilizing the ocean and its inhabitants to the greatest advantage to man, controlling its harmful activities and most important of all gaining an understanding of the various phenomena of this vast expanse of water is just as thrilling to the scientist who has imagination and forethought.

Pacific Grove

HOPKINS MARINE STATION OF STANFORD UNIVERSITY

by

Dr. W. K. Fisher

THE Hopkins Marine Station is located on the southern point of Monterey Bay, California, in the town of Pacific Grove, adjacent to Monterey, the first capital of the state. It is about 130 miles south of San Francisco.

The Monterey Peninsula, between Monterey Bay and Carmel Bay, a few miles to the south, has a rugged picturesque shore line backed by groves of cypress and densely wooded pine-clad hills. South of Carmel Bay lofty mountains rise directly from the ocean without the formality of a coastal plain. On the Monterey Peninsula, granite headlands receive the full force of surf from the open Pacific, but innumerable sheltered, rocky coves and sandy beaches provide homes for an extraordinary variety of intertidal animals and plants. Even exposed rocks are densely covered with mussels, barnacles, kelps, which afford protection to a host of smaller animals. Tributary estuaries of Monterey Bay contain an entirely different fauna, one characteristic of quiet water and deep sand and mud bottoms, extensive areas of which are uncovered at low tide.

The sea water is distinctly cold and the fauna is a cold water fauna, although there are numerous elements derived from the south. There is a surprisingly large number of marine animals and plants readily accessible. Such include not only the species found between tide levels, but also those which dwell in the open ocean, and those which are secured by dredging at various depths. The student of land forms will find an equally interesting and in some ways peculiar assemblage of material.

This is in part due to an unusual variety of physiographic and climatic conditions within a relatively small area, and in part to the presence of a number of characteristic and dominant types such as the Monterey Cypress and Monterey Pine. The particular advantage of work at the Station is the possibility of observing and studying a large number of living animals while these are still fulfilling their role in the general scheme of marine and terrestrial life. Investigators in the fields of general experimental work, taxonomy, anatomy, and embryology, will find a wealth of material to choose from, while those concerned with a study of animals from the special standpoint of their "marineness" will naturally be exceptionally favored.

Algae are present in great abundance along the shores of the Monterey Peninsula. This region is of great interest to the systematist since it is the type-locality for so many of the marine algae peculiar to the Pacific Coast. There are about forty genera of brown algae, including some of the most striking of the giant kelps. The ninety or so genera of red algae found in the local flora include representatives of all orders. Many of these are in fruit during the summer and thus afford material for one interested in the morphology of the group. Green and blue-green algae are less abundant but include a fairly wide range of forms.

The groups which especially give character to the fauna are the coelenterates, polyclads, nemerteans, bryozoans, echinoderms, chitons, gastropods, polychaets, the higher crustacea, and the tunicates. Among actinians, Evactis, Epiactis, Urticina, and Corynactis are the highlights. The solitary coral, Balanophyllia, is abundant. There are about ninety species of hydroids, and Scyphozoa are represented by Aurelia, Chrysaora, and Pelagia. Siphonophores and ctenophores are occasionally common but of uncertain occurrence.

For experimental biology an abundance of sea urchins *(Strongylocentrotus purpuratus* and *franciscanus)* is available. The sea star, *Patiria miniata* is equally good. *Leptasterias aequalis* and *Henricia leviuscula* brood their eggs. The same is true of the small holothurians, *Cucumaria curata* and *Thyonepsolus nutriens.*

There are upward of fifty species of chitons, the largest, *Cryptochiton stelleri,* reaching a length of twelve or fifteen inches. Prosobranch and nudibranch gastropods abound. The large abalone (Haliotis) is the outstanding mollusc of the coast. Dorid nudibranches are conspicuous for their size and brilliant coloring. The bay teems with squid in spring and summer, and octopus, which is common but not easy to procure, reaches a weight of forty pounds.

Among the polychaets are numerous representatives of Halosydna, Polynoe, Nereis, Leodice, Lumbrinereis, Glycera, and Amphitrite. A showy sabellid, Eudistylia, is abundant, while every rock-pool is alive with serpulids. Arenicola is less easily procured. A big echiuroid, *Urechis caupo,* is an almost perfect type for experimentation, and its large clear eggs can be procured without injury to the animal. Sipunculids are abundant and large. Conditions appear to be ideal for flatworms and nemerteans. Bryozoa, especially the encrusting forms, are conspicuous and compete for available surface with sponges and very thrifty compound ascidians.

Among the crustacea the crabs are most conspicuous, but of more interest are the primitive burrowing shrimps, Callianassa and Upogebia. Emerita is abundant as are also pagurids and several mysids. Barnacles of several species are very abundant on the granite and of course swarms of isopods and amphipods.

Mention should be made of the hag-fish, Polistotrema, of the chimaeroid, *Chimaera colliei,* and of the midshipman, *Porichthys notatus,* which is equally interesting for its conveniently deposited eggs and numerous photogenic organs.

The plankton of the bay is rich in larval forms and protozoa.

The Station is a department of Stanford University and is open the entire year with a resident staff, augmented during the summer quarter by additions from the School of Biological Sciences of Stanford and sometimes by visiting instructors. It provides facilities for visiting investigators, and furnishes elementary and advanced instruction in biology.

The Station has two buildings. The Jacques Loeb Laboratory is adequately equipped for most phases of current biological investigation in fields requiring the experimental method. The Alexander Agassiz Laboratory contains most of the space devoted to undergraduate classes and to work of the oceanographic program. Both buildings are provided with running sea water.

Graduate work is offered during the coming summer quarter by L. R. Blinks (Plant Physiology); Rolf L. Bolin (Marine Ecology, Marine Fishes); W. K. Fisher (Marine Invertebrates); V. E. Hall (Comparative Physiology of Marine Organisms); A. R. Moore (Experimental Embryology); C. B. van Niel (Microbiology); T. Skogsberg (Oceanic Biology); G. M. Smith (Algae); C. V. Taylor (Protoplasm).

Undergraduate courses are scheduled as follows: Marine Biology, two divisions (Skogsberg and Bolin); Marine Algae (Smith); General

Microbiology (van Niel); Physiology of Marine Plants (Blinks); Comparative Physiology (Hall); Individual Work (Staff).

The fee for undergraduate students is $100 for the quarter. Visiting investigators are charged a minimum fee of $25 per quarter, and for the use of larger rooms or more expensive equipment, upward of $50 per quarter. Students are supplied with compound and dissecting microscopes, and ordinary equipment. The summer session opens June 25th and closes August 29th.

Pacific Grove is a quiet seaside resort and may be reached by a short side trip from Salinas on the coast highway between San Francisco and Los Angeles; or by the Coast Division of the Southern Pacific Railway.

Summer visitors should be provided with overcoats and warm clothing generally. While the central area of California may be very warm in summer, the coast is quite otherwise. Owing to the cold water of the Pacific and to frequent evening fogs the days are usually cool and the nights invariably so. This difference in the coastal climate is reflected by a highly characteristic flora and fauna sharply differentiated from that of only a few miles inland. Forests of redwood (Sequoia), Douglas spruce, and several species of pine encourage the presence of numerous plants and several birds of boreal affiliations. Although the Hopkins Marine Station is situated in the same latitude as the Dismal Swamp, its summer climate is reminiscent of Nova Scotia or Newfoundland, while winter temperatures suggest the coast of South Carolina.

Los Angeles

THE U. S. C. L. A. SUMMER COURSE

by

DR. F. M. BALDWIN

SINCE the burning of our station building at Venice, California, the Marine Biological Station of the University of Southern California is located on the fourth floor of the new Science Building at University campus. Here a suite of rooms radiate about a large, general laboratory, wherein are installed chemical desks, fresh and salt water aquaria, and other permanent equipment suited to the needs of the marine investigator.

Individual cubicles are provided for research workers, supplied with the glassware, locker supplies, and other equipment necessary. Adjoining the larger laboratory room are preparation rooms and museum rooms suited to the preparation of taxonomic materials and the storing of specimens. Several individual research rooms, equipped with chemical desks and glassware, gas, running water, and compressed air, are also included, and devoted to special problems and research in the field of taxonomy and studies in inter-physiology of type-forms.

A large working collection of type forms of the marine fishes of the southern Pacific waters are available to properly prepared students who might wish to study these vertebrate forms. A key to this collection of marine fishes was prepared and edited by the former director of the station, Professor Albert A. Ulrey, and appears in printed form from the press of the Southern California Academy of Science.

The analysis of records of the survey work of the station launch, the Anton Dohrn, for many years operating off San Pedro Harbor and the Channel Islands, but now discontinued, also form an integral part of station activities.

Course work in the station for credit in The University of Southern California is listed in the Graduate Bulletin within the Departments of Zoology and of Botany, but independent investigators wishing to avail themselves of the facilities of the laboratory should communicate with the director. It is to be remembered that the favorable weather conditions make it possible for research work to be prosecuted the year around in southern California.

CAMPAIGN PLATFORM PLATITUDES

When I look into this sea of upturned faces, showing such rare intelligence—

I shall dwell upon one other point briefly and then I am done.

And that reminds me of a little story which perhaps some of you have heard before.

Ah, how well do I remember the humble cot in which I first saw the light of day!

I trust, now, that I shall not be taxing your patience.

Words fail me—

Whatever I have accomplished in my humble way, I owe to the steadfast and loyal support of you, my friends.

The dearest—I may say the one—wish of my heart is that when I shall have fulfilled my mission as the representative of this the grandest, most glorious district (or state) the sun ever shone upon, a district (or state) whose women are paragons of virtue and beauty and whose men are worthy sons of noble sires, my ears shall hear that blessed voice of approval so dear to the hearts of true men, "Well done, thou good and faithful servant!"

COLORADO

Boulder

SCIENCE LODGE

by

DR. HUGO G. RODECK

THE mountainous area of Colorado offers the best of opportunities for the study of plant and animal distribution in relation to climate, because so many different climates exist within a distance of a few miles. The University of Colorado's Science Lodge, located in the mountains 20 miles west of the city of Boulder at an altitude of approximately 9,500 feet above sea level, offers students the opportunity of studying the plant and animal life of five life zones within an air distance of about 25 miles. From the Upper Sonoran of the plains east of Boulder, the seat of the main campus of the University, through the Transition, Canadian, and Hudsonian, to the treeless Alpine of the peaks of the Continental Divide is only a matter of a few hours.

Laboratory Building.

Such a field offers equal opportunity to the undergraduate who seeks an introduction to life *in situ* and to the graduate student or instructor who wishes to investigate a problem in a relatively unworked field. Within easy reach of Science Lodge are various kinds of forests, grasslands, semi-arid plains, and rock deserts, with their characteristic animal and plant populations. There are more than 75 lakes, ponds, and streams suitable for limnological studies. Many taxonomic, biological, and ecological problems await investigation in the fields of botany, ornithology, mammalogy, invertebrate zoology, and limnology.

The location of Science Lodge, on the flank of Mount Niwot, just below timberline, assures a bracingly cool summer climate. The site is surrounded by rugged peaks, snowbanks, and a living glacier above timberline; by lakes, and forests threaded with mountain streams, trails, and roads below timberline.

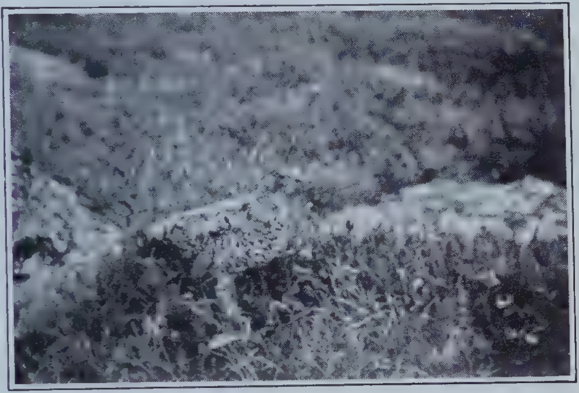
Water Lilies.

The comforts of home are combined with the freedom of camp life. The grounds and all buildings are electrically lighted. Removed from the dining hall and interspersed among the pines are the cabins, equipped for two students, though available for single students if the camp is not too crowded. These cabins are heated, lighted, and provided with rough furniture and two good single beds with mattresses. There is no camping out; all sleeping is done in cabins or in hotels on overnight trips. Bathing facilities, with hot water on tap, are modern.

Campfire Lecture.

Recreation is provided in the form of games, both indoors and outdoors, hiking, lectures, and occasional cooperative trips to Boulder and other towns for movies, plays, or dances. An expedition is always made to the plays produced each summer at the famous old Opera House at Central City, Colorado.

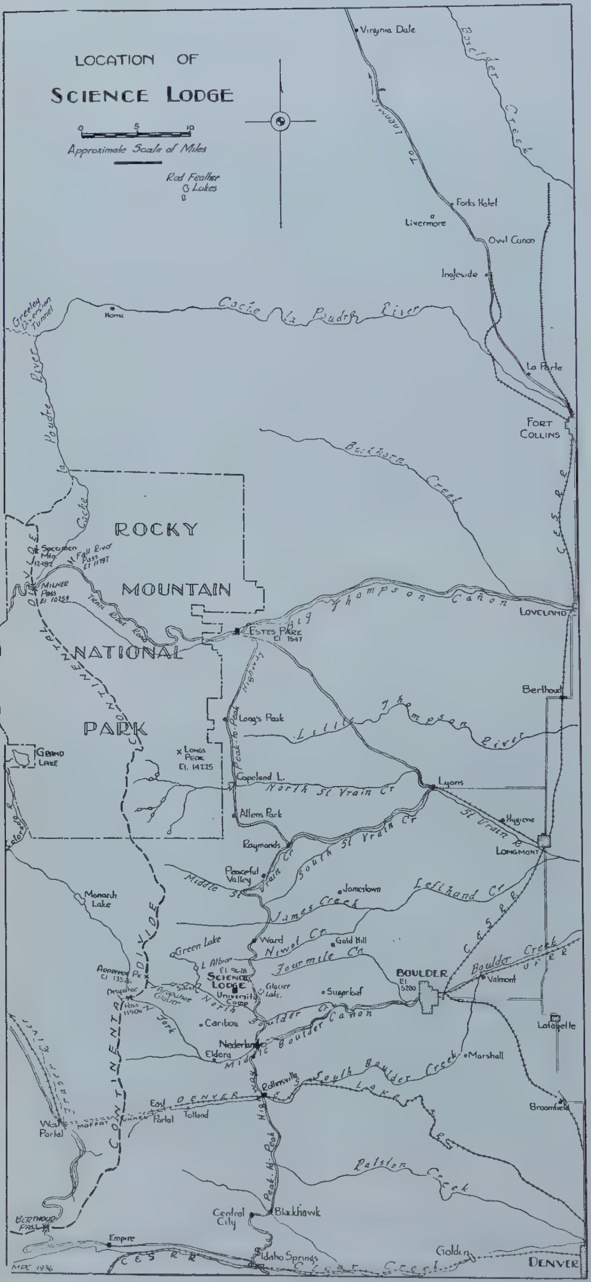
Three days a week are given to field trips through the region, including the wilds of the high peaks of the Boulder area, the spectacular Trail Ridge Road in Rocky Mountain National Park, beautiful Specimen Mountain, and the well-known Estes Park. Other trips take the classes to the treeless plains of northeastern Colorado and to the rugged butte country north of Fort Collins, where the recent excavation of a campsite of Folsom Man by the Bureau of Ethnology has attracted national attention. Busses are provided for field trips at no additional expense.


Ptarmigan, an Alpine Bird.

Three days a week are spent in camp in laboratories and classrooms. Modern laboratories for Botany and Zoology offer the student, beginning or advanced, all necessary facilities, and the resources of the University of Colorado are available for almost any equipment. The library is very complete for the biology of the area, but again any deficiencies due to special requirements may be supplied from the University Library on short notice. Courses receive full University credit, and academic standards are the same as those on the campus.

A Student Cabin.

The courses offered include elementary and taxonomic botany, ornithology, limnology, ecology, and others. Advanced students desiring work in a specific field, where possible, may engage in a special problem under the supervision of the staff.



Map of the Science Lodge Area.

The Summer Quarter is divided into two terms of five weeks each, which run concurrently with corresponding terms on the campus. Students may attend either or both of these five-week terms, and may earn a maximum of 9 quarter hours per term. One's whole time may be devoted to Biology, or, when the program permits, may include courses in Geology, in which subject an attractive list of courses is offered. The sessions for the summer of 1937 are June 21 to July 23, and July 26 to August 27.

Additional information may be obtained by addressing Dean of the Summer Quarter, University of Colorado, Boulder, Colorado.

Crested Butte

ROCKY MOUNTAIN BIOLOGICAL LABORATORY

by

DR. JOHN C. JOHNSON

THE "Gothic Area" comprises about a half million acres of virgin territory, uninhabited by residents, tourists or campers. There are numerous high mountains, rivers and streams, lakes, bogs, swamps, mountain and alpine meadows and regions of perpetual snow. The great range in elevation (8,000 to 14,000 feet) makes for great diversity in fauna and flora and offers examples of many different ecological communities.

In 1930 the U. S. Forest Service set aside the "Gothic Natural Area", in the Gunnison National Forest, a permanent research tract of about 905 acres, not far from the laboratory. Of this area some 500 acres, is a virgin spruce-fir timber tract, while the other 400 acres is composed of alpine meadows, marshland and open grassy parks.

Gothic Mountain (Altitude 12,646 ft.) With Its Snowbanks in July
Laboratory Buildings (Altitude 9,500 ft.) Located at about Center of this Picture.

The Laboratory is located near Crested Butte, Gunnison County in Western Colorado, about three hundred miles from Denver by rail—the Denver and Rio Grande Western narrow gauge railroad terminating at Crested Butte, eight miles from the Laboratory. The postal address is Crested Butte. See your railroad agent for reduced round trip rates to Colorado. Some prefer to come by automobile. Highway U. S. 50 passes through the town of Gunnison, thirty-eight miles from the laboratory.

In 1932, the *National Research Council* after an investigation of the plans, facilities, and character of the work done, *voted its indorsement* of the work of the Laboratory. It has also assured the Corporation of its backing in its further endeavors to develop and improve the station.

The Laboratory will be opened June 28 to enable biologists who attend the Denver meetings of the A. A. A. S. to come to Gothic *immediately* afterwards for a visit, or for a longer period of investigation, study and recreation. A three day excursion, beginning Sunday, June 27, is being arranged from Denver to the Laboratory. The total cost for this three-day trip is approximately $12.00 and includes lodging (3 nights) and meals and transportation by auto, covering in the round trip some 570 miles in the very heart of the Rockies. The Laboratory centers its activities around problems of the alpine and sub-alpine regions. Communicate early with the Director of the Laboratory, if interested.

DEPARTMENTS OF INSTRUCTION AND RESEARCH

The courses listed below are primarily for graduate students in biology and for advanced undergraduates. Only those students qualified to pursue the courses desired should apply for admission.

Ecology

A. O. Weese (Ph.D., Illinois), Prof. of Zoology, University of Oklahoma.
Harriet G. Barclay (Ph.D., Chicago), Tulsa, Oklahoma.
J. Teague Self (Ph.D., Oklahoma), Zoology Department, University of Oklahoma.

A field, lecture, and laboratory course in Bio-ecology, with especial reference to the communities in the Rocky Mountain area. Special problems dealing with animal and plant relationships in the Gothic area.

Field Botany

Edgar T. Wherry (Ph.D., Pennsylvania), Assoc. Prof. of Botany, University of Pennsylvania.
B. D. Barclay (Ph.D., Chicago), Prof. of Botany, University of Tulsa.
Francis Ramaley (Ph.D., Minnesota), Prof. of Botany, University of Colorado.
Mary Howe Schott (Ph.D., Iowa State), Columbus, Ohio.

A field, lecture, and laboratory course dealing principally with the plants representative of the vegetation of the Rocky Mountain area, particularly of the high Colorado Mountains.

Field Zoology

A. Richards (Ph.D., Princeton), Prof. of Zoology, University of Oklahoma.

Mildred H. Richards (Ph.D., Columbia), Norman, Oklahoma.

A. W. Lindsey (Ph.D., Iowa), Prof. of Zoology, Denison University, Ohio.

Reginald D. Manwell (Sc.D., Johns Hopkins), Asst. Prof. of Zoology, Syracuse University, N. Y.

Ralph G. Schott (Ph.D., Iowa State), Ass't Prof. Zoology, Ohio State University.

A field, lecture and laboratory course dealing principally with the groups, both vertebrate and invertebrate, characteristic of the Rocky Mountain area.

Parasitology

John C. Johnson (Ph.D., California), Prof. of Biology and Head of the Division of Science, Pennsylvania State Teachers College, West Chester.

Asa C. Chandler (Ph.D., California), Prof. of Biology, Rice Institute, Texas.

Geo. W. Hunter III (Ph.D., Illinois), Asst. Prof. Biology, Wesleyan University, Conn.

A laboratory and lecture course in parasitology, dealing with the important parasites of man and the lower animals; also consideration is given to the mammalian, avian, and molluscan parasites of the Rocky Mountain area.

The staff members indicated above by asterisks will be available this summer to direct the research work of qualified students.

The facilities of the laboratory are available in all divisions, as listed, and research may be undertaken by students under direction or by independent investigators. Students wishing to carry on research should correspond with the instructor in charge of the work. Independent investigators should correspond with the director. Only persons of considerable maturity or of academic attainment equal to a master's degree are expected to attempt independent investigations.

Recreational activities include mountain climbing, trout fishing, hiking and camping. There are numerous high mountains, with perpetual snow, many trout streams and lakes nearby, and large relatively unfrequented areas. These offer opportunities for short hikes or more extensive camping trips. While it is hoped that everyone will take advantage of the unusual opportunities afforded for recreation, only those are encouraged to come whose primary aim is study or research.

Laboratory Fees or Research Table	$ 50.00
Board (meals at $1.25 per day)	50.00
*Room or tent house (double), furnished	20.00
Grand Total	$120.00

Independent investigators pay a $40.00 fee for a research table. Otherwise the expenses are the same as for students. These tables should be arranged for in advance with the Director to insure a place.

Communications should be addressed to Dr. John C. Johnson, Director of the Laboratory, 26 Price St., West Chester, Pennsylvania. (After June 10th—Crested Butte, Colorado.)

The above includes all necessary expenses except personal laundry, text-books, expensive chemicals and microscope. The latter can be rented for $5.00.

* Those who bring their own bedding may deduct $6.00 from room rent, if arranged in advance. Those desiring to stay over after the regular session may do so by arranging with the director.

Saddle horses may be rented by day, week, or month at exceedingly reasonable rates.

Timberline Trees.

NOTHING TO BRAG ABOUT

"Ninety-seven years old, eh?" commented the tourist, who had just had the village's oldest inhabitant pointed out to him. "Well, that's a wonderful record. I suppose you folks are very proud of him."

"Oh, I dunno," replied the native cicerone. "His record ain't so wonderful. He ain't done nothin' in this town 'cept grow old, and looky how long it took him to do that!"

—*Nuggets*

CONNECTICUT

Lakeville

COLUMBIA UNIVERSITY COURSE

by

DR. GERALD S. CRAIG

THE course is designed to give teachers guidance in the utilization of features in the natural phenomena of the out-of-doors. The work consists of two parts: (1) field work in the out-of-doors and (2) application of the techniques and knowledges secured in the field work to the instruction of the various grade levels of elementary and secondary schools, from the kindergarten through the twelfth grade.

The field work will give teachers an opportunity to gain a more intimate acquaintance with objects and phenomena of the natural environment. Emphasis is placed on the interpretation of the features of the local region to which recognition and identification will be used as a means. The region is considered with respect to the story of its formation and the geological and biological principles illustrated there. The rocks and soils and the plant and animal life are studied with respect to their interrelations and interdependence. Maps and geological folios, guide books, constellation charts and keys of ferns, flowers, trees, insects, birds, etc., are used constantly, to give the students the knowledge and techniques necessary to building up an acquaintance with the objects and phenomena in any locality in which they may teach. The work includes some instruction in astronomy with an opportunity to identify various planets, stars and constellations and to study their real and apparent motions. There will be assigned readings, lectures, and classroom discussions on the work done in the field.

In the application of the techniques and knowledge secured in the field work to the instruction at the various grade levels, the class will be divided into elementary and secondary school groups according to individual interests of the students, and the groups will be assigned to the instructors primarily interested in the particular level. Opportunity will be given for the students to construct units of instruction and curriculum materials in science as well as to attack their individual problems of science instruction.

The situation will be such as to encourage conference groups composed of students with common problems. In connection with this work, attention will be given to use of the out-of-doors as a laboratory in teaching science in the elementary and secondary schools.

Most of the field work will be conducted on a large tract of land adjoining the Inn. A few trips will be made to other localities for those who wish to extend their studies. For these trips a small charge must be made for transportation. The trips, however, will be voluntary; those not wishing to participate may use these periods for more intensive study in the area immediately adjoining the Inn or in study of their own problems in science teaching. Different types of activities led by various members of the staff will be in progress at all times.

Interlaken Inn is located at Lakeville, Connecticut, in the northwestern corner of the State, about one hundred miles from New York City, and may be reached by train to Millerton, New York, on the Harlem Division of the New York Central.

Students are urged to provide themselves with wearing apparel appropriate for out-of-door study. Time will be allotted for recreational activities.

Since the course is limited in enrollment, those who are interested should make application to the Office of the Secretary, Teachers College, well in advance of the beginning of the course. Additional information, including details concerning rooms and board, will be supplied on request.

To receive full credit, students must complete registration not later than 4 p. m. on the Monday on which they are entering the course (June 14, 21, or 28).

It is listed in the Teachers College Bulletin as follows:

Education sj269AD—Science of the out-of-doors. Credit III, IV. 2 to 4 points. Professors G. S. Craig, E. B. Matzke, and H. J. Arnold. Students may register for the entire course (four points, June 14 to July 9), or they may take two or three weeks' work beginning at 8:30 a. m. on June 14, 21, or 28, with credit of two points for two weeks, or three points for three weeks (Monday through Friday). The course will be given in the Berkshire Hills at the Interlaken Inn, Lakeville, Connecticut. Enrollment is limited.

For further information, address Professor Gerald S. Craig, Teachers College, Columbia University, New York City.

NEW HAMPSHIRE

Nelson

MERRICONN BIOLOGICAL LABORATORY

by

DR. PARKE H. STRUTHERS

A FEW miles north of Keene, New Hampshire, one finds the happy combination of lake, forest, field and highland which has come to be regarded as an ideal vacation land. To this region came Admiral Byrd to write his memoirs of the last Antarctic expedition. Here come, year after year, the students of the Sargent School of Physical Education, the actors and musicians to the McDowell colony in Peterborough, the host of young people to Marienfeld and other popular camps, together with the army of older folks, to make the old Cheshire hills a happy hunting ground for relaxation and refreshment of body.

Merriconn is a part of this region, located in the quiet little village of Nelson, one of the many dots found close to route nine on the road map. Here her five hundred acres spread out over the backbone of the range dividing the beautiful Merrimac and Connecticut watersheds. For over a hundred years, this old estate has acquired a romantic dignity which radiates from the scraggly shade trees, the quaint brick house, the maple and beech groves, the stone walls and blueberry pastures, shaded lanes and old growth timber. With a seventeen hundred foot elevation, Merriconn rests on a promontory, at the foot of which lies a cluster of ponds and picturesque Lake Nubanuset. Seven miles to the south looms the big purple sentinel, Mount Monadnock. There is excellent opportunity for boating, canoeing, swimming and fishing on the ponds. This is the setting students find at Merriconn. To it have been added accommodations for student use, but the atmosphere still remains that of an old New England farm.

In 1933 the laboratory building was erected. This is the center of activity at Merriconn. In the basement is the photographic laboratory, modelling room, woodworking shop and aquarium room. On the main floor are the general and private laboratories, the reference room and museum. The floor above is devoted to special research. The equipment is comparable with that of the average college biological laboratory. In the museum one has access to some three thousand preserved specimens of local flora and fauna, and many specimens of zoological interest collected in the tropics. The library contains about one thousand volumes and scientific pamphlets.

Living conditions vary to suit the wishes and purse of the student. One can usually choose between a tent, room in the farm house, a small cabin or a cottage. The bracing air, farm products and plenty of exercise make eating an occasion rather than a duty.

Merriconn Biological Laboratory enjoys certain advantages in being privately owned and directed. There are no prescribed classes, no college credits are given and examinations, when given, are at the request of the student who wishes to gauge relative accomplishments. What one acquires from the laboratory is measured in terms of student opinion, rather than that of the teacher who grants the usual credits. Merriconn admits only applicants who come highly recommended for their ability and aptitude for biological work. Such a modus operandi brings to the laboratory a group of biologists having an innate interest in Natural History.

The laboratory serves two types of students. The secondary school teacher who wants a broader teaching background and a knowledge of technical methods, and the college undergraduate with a more varied objective. When it is possible, the schedule of work is arranged before the student comes to Nelson, thus allowing for a better co-ordinating of the proposed program of study. A typical program would be that of Mr. X who has taught for several years in an academy in Rhode Island. For the morphological study we selected the Paramecium, Hydra, grasshopper, perch and frog. Plaster models were run off from molds of each animal, and Mr. X completed each model as he dissected the respective animal in the laboratory. As this study advanced he made celloidin preparations of the circulatory and respiratory systems, a transparency and skeleton of the frog or fish. Microscopic slides were made of various tissues. Copies were made from photographic negatives of numerous wall charts illustrating the anatomy of these animals. Experience was obtained in the technique of making lantern slides and strip film. In all this Mr. X did the technical work under guidance. He was given a copy of the Scrap Book, a set of sketches picturing the life history of one hundred common insects. From reference reading he prepared a paragraph about each, and on the field trips many stages in these life histories were observed. At Merriconn the porch lights have been remodeled to serve the added purpose of moth traps. From this source Mr. X obtained specimens for his moth collection. The insects were pinned out, identified from the museum collection, labelled and mounted in cases constructed in the work shop. With such a program, combining study with technical practice, this teacher was able to store up in a few short weeks material which will influence for years the quality of his teaching. The laboratory has developed an original line of teaching aids which students may prepare while at Merriconn. In most cases such work forms a supplemental part of the regular program, or as projects to be developed at home with the assistance of working plans furnished by the laboratory.

The college undergraduate usually has a program which embraces research methods in morphology or field biology applied to some central problem under investigation. This research may extend over a period of summers and eventually serve as a graduate thesis or warrant publication. As a substitute for regular courses Merriconn employs a tutorial system whereby students can cover the work done, for example, in protozoology or mammalian anatomy equivalent to similar work given in college. There is a common interest in the ecological and taxonomic work done on field trips. With enthusiasts for ferns, flowers, insects, et cetera, the various habitats, whether along lake shore or ridge, receive a careful combing for new forms. Collecting is superb in the vicinity of Merriconn because of its proximity to varying altitudes, the two watersheds and a profusion of different aquatic and land conditions.

The attendance at any one period during the summer is restricted to twenty-five. Students profit by this limited enrollment. Whether it be a laboratory demonstration, a fireside chat or a field trip the group is not too large to include everyone. In the limited group all investigations and activities are followed closely by the staff and each student knows, at least in a general way, the objectives and scope of the various problems. Although many of the Merriconn landmarks date back to colonial days and her natural history habitats were layed down by the prehistoric glaciers, the school is a mere infant in comparison with most of the other summer schools. Much of their collegiate atmosphere is absent for the Merriconn family enjoy a life similar to that of the average vacationer in the region. The educational advantages form a sort of biological filling station where a spirit of service invites those who have a genuine interest in Natural History.

A BOSS'S PRAYER

"Lord, give me strength to cut my stenographer's salary."

—*Widow*

IOWA

West Okoboji Lake

IOWA LAKESIDE LABORATORY

by

DR. J. H. BODINE

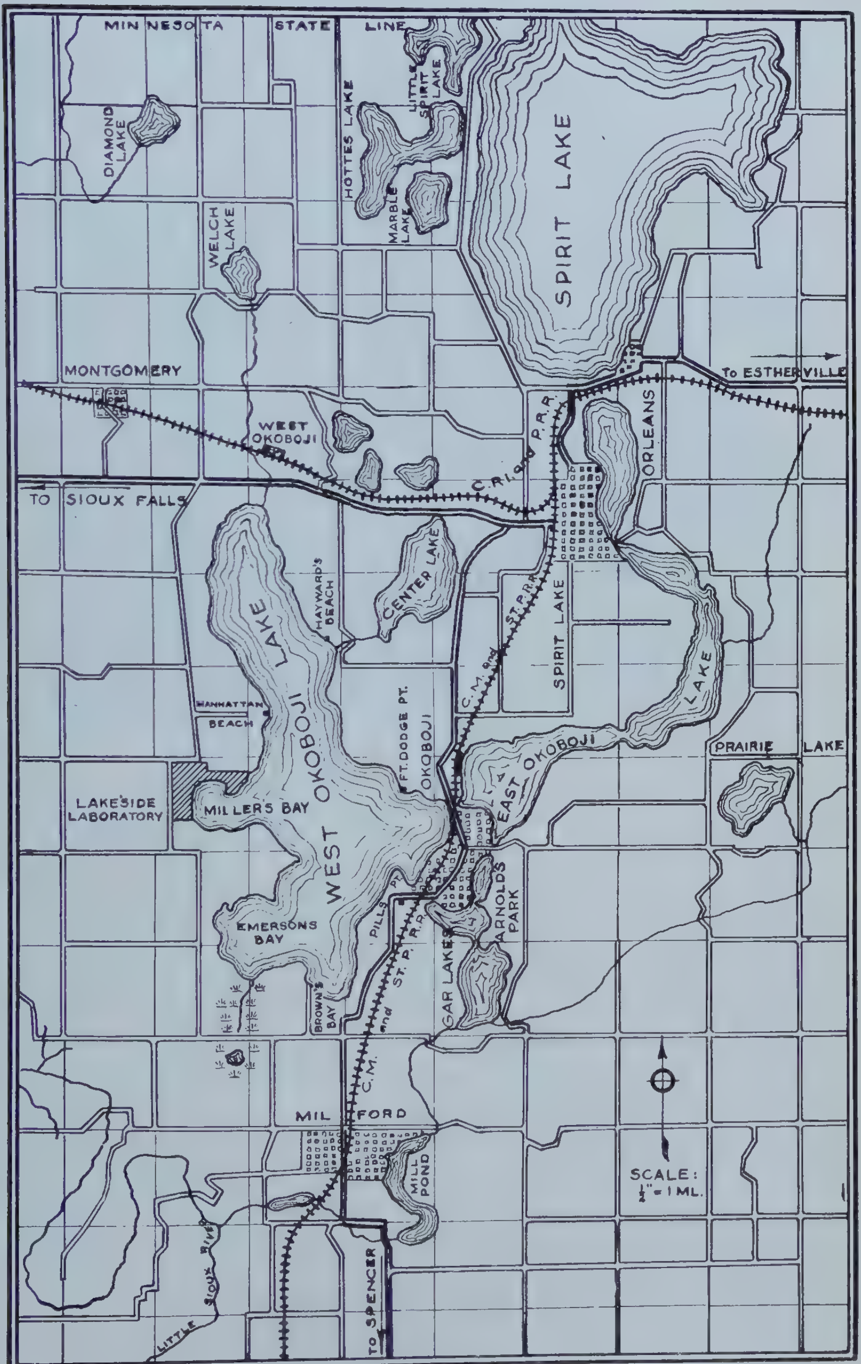
THE Iowa Lakeside Laboratory, first established in 1909, under the leadership of Professor Thomas H. Macbride, was the earliest attempt, on a non-commercial basis, to provide a place where the rich fauna and flora of the northern Iowa lake and prairie regions could be studied and conserved. For the past 28 years, the Laboratory has been used as a field biological station by students of the State University of Iowa and other institutions. During this period the Laboratory has been financed largely by a group of interested alumni and friends and has been operated by the State University to supplement its teaching of the biological sciences.

In May, 1936, the Iowa Lakeside Laboratory was deeded in trust by the Iowa Lakeside Laboratory Association to the State of Iowa for the purpose of better insuring the perpetuation and carrying out of the ideas of its founders: ''a station for the study and conservation of the water and of the flora and fauna of the State of Iowa.'' Thus, by this transfer, the Laboratory becomes in fact the *Iowa* Lakeside Laboratory.

A co-operative managership, in which various state and national agencies form an active and integral part, has been worked out. A Board of Managers appointed by The State Conservation Commission, State Board of Education, Iowa Lakeside Laboratory Association, U. S. Biological Survey, and the State University of Iowa, constitutes the official governing body responsible for the maintenance and general policies of the Laboratory.

LOCATION

The Station is ideally located in the immediate vicinity of a wide variety of conditions and habitats of interest to biologists. Both deep and shallow lakes are readily accessible. Iowa's finest lake, West Okoboji, is a glacial lake of rare beauty, 132 feet deep at the deepest point. A wealth of both plant and animal life finds a home in its waters. In surface area, it occupies 3,788 acres, and it has a shore line of eighteen


MINNESOTA STATE LINE
DIAMOND LAKE
HOTTES LAKE
LITTLE SPIRIT LAKE
MARBLE LAKE
SPIRIT LAKE
WELCH LAKE
MONTGOMERY
To ESTHERVILLE
WEST OKOBOJI
C.R.I. & P. R.R.
ORLEANS
TO SIOUX FALLS
CENTER LAKE
HAYWARD'S BEACH
SPIRIT LAKE
C.M. and ST. P. R.R.
MANHATTAN BEACH
FT. DODGE PT.
OKOBOJI
WEST OKOBOJI LAKE
EAST OKOBOJI LAKE
PRAIRIE LAKE
LAKESIDE LABORATORY
MILLER'S BAY
PILLS PT.
ARNOLDS PARK
EMERSONS BAY
GAR LAKES
BROWN'S BAY
C.M. and ST. P. R.R.
MILFORD
MILL POND
SCALE: ½" = 1 ML.
To SPENCER
LITTLE SIOUX RIVER

miles. It is connected directly with East Okoboji and the Gar Lakes, while Center, and Spirit Lakes are but a few miles distant. Many smaller lakes, Diamond, Welch, Marble, Hottes, Robinson, and Silver, each of which presents a different ecological situation may be easily reached from the Laboratory. The lakes of the territory have a combined surface area of more than 13,000 acres, and more than eighty miles of shore line.

Zonation of Plant Communities Along Shore of Miller's Bay.

Facilities for Instruction and Research

The Laboratory campus is a tract of some hundred acres adjacent to Miller's Bay on the west shore of West Okoboji Lake. The entire shore line of this section of the lake is controlled by the Laboratory and thus serves as a natural experimental ground for the work of the school. The buildings are divided into two groups and are located in two areas—one group comprises the laboratories proper while the other, to the north, makes up the residential area and is composed of cottages and dining hall. During the past year an entirely new set of buildings has been erected on the campus. Through State and Federal agencies, there have been built four new stone laboratories, a library, a boat house, and additional cottages. Photographs of these buildings are shown elsewhere in this magazine.

A working library is maintained and special books and other publications may be secured from the University if occasion demands. Microscopes and collecting apparatus are furnished and a dark room is provided for photographic work.

Water Crowfoot in Quiet Waters of the Little Sioux.

The Laboratory Museum contains skins of most of the birds and animals common to the region and is being built up as additional specimens are collected.

The Iowa Lakeside Laboratory offers interesting opportunities for the study of plants. Habitats ranging from high morainic knobs to lakes and kettle holes support a variety of plant communities. Rather deep ravines are wooded, and the abundant springs often support hanging bogs. The laboratory tract includes both bluff and low lake shores, a broad swamp, three hanging bogs, and both high and low prairie which are in process of restoration from pasturing. Other areas nearby are available for comparative study.

The abundance of lakes and kettle holes give a wide variety of water plants, both seed plants and lower forms. The many kinds of phytoplankton have attracted students for years. Herbarium, library, and laboratory facilities are available for the study of most plant groups.

Since the Laboratory is especially designed to supply necessary facilities for the complete investigation of the fauna and flora of the area for which it is typical, a regular course of intensive study for ten weeks of the summer period is offered. This course is specifically planned to meet the demand for training in conservation and biological fields of investigation. Such training is an essential phase of biology, since the field is the source of materials upon which biologists are dependent. An understanding of the problems of biology is the result of experience and knowledge of the normal behavior, habits, and habitats of animal and plant species. The primary object of the course is to provide an opportunity for the student to meet directly the natural conditions with which field biologists are constantly confronted. Because of lack of time and unfavorable locations, the more formal biology courses of the regular winter terms of many universities and colleges are unable to present even the simplest fundamentals of field experience. The summer period further enables the student to concentrate his interests at a time when seasonal conditions are most favorable for outdoor activity. For these reasons, the course of study is particularly adapted for all students of natural science, the conservationist, those preparing to teach biology, those already teaching biology in elementary and secondary schools and to whom such experience would be advantageous, and also those who wish to do independent research in some phase of field biology.

Library Building.

For the study of animal life, there is a broad range of terrestrial and aquatic habitats. Numerous small lakes, ponds, streams, wooded areas, and fields are readily accessible by motor car, boat, or within hiking distance. The fauna is representative of the Upper Missouri and Mississippi valley region.

Representative forms of the five main vertebrate classes may be studied under best conditions in the early part of the summer during late June and July. Small mammals are numerous. Several species of amphibia and reptiles occur in large numbers. Approximately fifty species of fish, characteristic of the Minnesota-Wisconsin area except for a few species, inhabit the rivers and lakes of the region. Certain species spawn during late June and July, and thus present an opportunity to study breeding behavior, nests, care of young, and embryonic development. Little Miller's Bay, surrounded by the laboratory grounds is usually protected by the Iowa State Conservation Commission as spawning grounds. Co-operation with the Division of Fisheries of the Iowa State Conservation Commission has made possible certain collecting and the utilization of equipment and laboratory space at the state hatchery at Orleans and the spawning station at Okoboji. Numerous ecological problems arise each summer in connection with the fish populations of the shallow lakes and the numerous breeding ponds maintained by the Commission. Direct studies of these problems are often possible.

Rear View of New Cottages.

Of great interest are the birds that regularly reside and nest in this locality. It is not unusual to observe and identify as many as one hundred fifty or more species out of a probable two hundred resident species. Introduced game birds, such as the Chinese ring-necked pheasant and the Hungarian grouse are rapidly becoming established and nest on laboratory grounds. Especial attention is directed toward the water and shore birds, which are abundant and in active nesting behavior during July. Wild ducks, common and black terns, herons, bitterns, grebes, gallinules, and sandpipers are common. Rookeries of the pelican and the black-crowned night heron have been available for study. Passerine inhabitants of the marshes include several unusual sparrow species, marsh wrens, and both red-wing and yellow-head blackbirds.

Following the active breeding seasons of many of the vertebrates, attention is turned toward the invertebrate fauna, which is abundant and varied. Sponges, polyzoans, hydra, aquatic, terrestrial, and parasitic nematodes, flatworms, rotifers, aquatic oligochaetes, and leeches are plentiful and easily obtained. Protozoa, rotifers, and microcrustacea occur in great numbers in the plankton of the deep West Okoboji Lake, Spirit, Gar, and other lakes. Little is known of the bottom fauna of the locality. Numerous hanging bogs, kettle holes, and temporary ponds likewise present supplementary materials. Many species of land and water snails are present in the territory, and numerous clams inhabit the Little Sioux

River a few miles from the laboratory. The Laboratory is very fortunate in having for study a part of the Shimek collection of living, fossil, and extinct molluscs of Iowa. Many orders of insects and spiders are represented in the region. Large numbers of crayfish have been collected within a very short time in the Little Sioux River, and they are also common in many of the small lakes. Nearly all orders of crustacea are represented in greater or lesser degree, but an exact record is not available. In general, biological problems concerned with the invertebrates of the region are practically untouched, and are open for investigation.

The environment of the Laboratory affords an excellent opportunity for study of the protozoa. The numerous ponds and lakes contain a large number of species of all of the major groups of fresh water forms; all of the orders and most of the families are well represented. The numerous vertebrates and metazoan invertebrates present serve as hosts for many parasitic species, and adequate material is available for the study of parasitic protozoan life histories. The course offered in protozoology consists of daily lectures and laboratory work on the free-living and parasitic species. Ample opportunity is afforded those who wish to do research.

Front View of New Cottages.

GENERAL LIVING CONDITIONS

Several small cottages for families are located on the campus overlooking the lake. Separate dormitories for men and women are maintained. The new dining hall can comfortably accommodate the entire group of students and faculty, who by arrangement may secure meals for guests for a limited time.

Hot and cold shower facilities are located in bath houses and sanitation is provided by a modern sewage disposal plant.

While serious work is the order of the day, recreational activities are not lacking. Swimming, boating, fishing, tennis, and golf are the most popular sports. The library, which contains a reading room with fireplaces, tables, and chairs, affords a social center for the group.

EQUIPMENT

The Laboratory has a limited stock of the more commonly used reagents and supplies. Anyone anticipating the need of special apparatus should communicate with the director in advance. The electric current is 110 volt A.C. Those wishing to bring their own microscopic lamps or any laboratory electrical equipment adapted to this current may do so.

The Dining Hall.

Cots and mattresses only are furnished by the Laboratory. Personal equipment to be brought with one should include pillows, plenty of warm bedding, clothing suited for field work, and bathing suits. Rubber boots or shoes suitable for wading are useful, as well as field glasses, and either a vasculum or a hand press. All students should have simple dissecting instruments. A good pocket knife and a hand lens are almost indispensable.

EXPENSES

Tuition will be $32.00 a term, which includes laboratory fees. Those not enrolled for university credit pay a laboratory fee of $1 00 per week. Room rent is $1.00 per week in the dormitories and $1.50 per week in the private cottages. The laboratory mess is operated on a co-operative basis, all present taking their meals in the common dining hall. Board during the 1937 season will be $27.50 per term, payable on registration day, which will permit the purchase of supplies at wholesale prices.

Part-time jobs helping in the mess and laboratory are available for a few students wishing to earn a part of their expenses. Application for such work should be made at once to the director.

REGISTRATION

Registration will be held at the Laboratory on Monday, June 14, for the first term, and on Monday, July 19, for the second term.

The dormitories will be opened on Saturday, June 12. Students should arrive by Sunday, June 13, if possible. Those coming by train will be met by car at nearby towns if notice is sent to the director in ample time.

Graduates who expect credit, if not already enrolled in the Graduate College of the University of Iowa, must be formally admitted by the Dean of the Graduate College by personal interview or by written application accompanied by a transcript of all high school, undergraduate, and graduate credit. This should be done before the session opens. Transfer of credit to other graduate institutions can not be granted unless matriculation in the Graduate College of the University of Iowa has first been completed.

Student Dormitory.

Applications for admission should be made at once, since space in the Laboratory and in the dormitories and cottages is allotted in the order in which applications are received.

The applications of undergraduates not enrolled in the University should be accompanied by a statement of their credits together with certification of good standing from their respective schools.

Visiting Investigators

Facilities will be available for a limited number of independent investigators for any portion of the period from June 7 until August 31. Correspondence should be started at once so that full arrangements can be made if special equipment will be needed.

All communications should be addressed to Professor J. H. Bodine, Department of Zoology, State University of Iowa, Iowa City, Iowa.

MAINE

Bar Harbor

MT. DESERT LABORATORY

by

DR. WM. H. COLE

HISTORICAL SKETCH

THE Mt. Desert Island Biological Laboratory had its origin in the organization of the Harpswell Laboratory at South Harpswell, Me., by the late Dr. J. S. Kingsley of Tufts College in the spring of 1898. At first planned as a summer school of biology for students it soon developed into a research laboratory for independent investigators. In 1913 the laboratory was reorganized as a scientific corporation under the laws of the state of Maine with a board of trustees and J. S. Kingsley as director. Until 1921, or for 22 years, small groups of biologists gathered each summer to conduct investigations on the great variety of animals and plants so plentifully found along the coast of Maine. Among the men and women were many who have since become nationally known for their research on living organisms and for their teaching ability. Over a hundred publications in various biological journals constituting important contributions to knowledge appeared as concrete evidence of accomplishment.

The success and value of the laboratory having been thus proved steps were taken in 1920 to acquire sufficient property and funds to make the laboratory more efficient and independent. Through the generosity of the Wild Gardens Corporation of Mt. Desert Island, the guiding spirit of which was George B. Dorr (now Superintendent of Acadia National Park), the laboratory secured the use of several acres of land at Salsbury Cove. In 1921 the laboratory was moved to Mt. Desert Island and renamed the Weir Mitchell Station of the Harpswell Laboratory, under the directorship of Ulric Dahlgren of Princeton University. A laboratory building was erected on the water front and work began during the summer. During the next two years eighty acres of land were purchased from the McCagg estate, and the land of the Weir Mitchell station was deeded by the Wild Gardens Corporation to the new corporation known as the Mt. Desert Island Biological Laboratory. Since then some of the McCagg tract has been set aside for home sites for investigators, and there are now seven residences in use. In 1926 Professor Dahlgren retired as director and Dr. H. V. Neal succeeded him. During 1928 the laboratory founded by Dr. C. C. Little at Bar Harbor was amalgamated with the Mt. Desert Island Biological Laboratory and designated the Dorr Station. The latter is located on the property of the Jackson Memorial Laboratory south of Bar Harbor, and was originally provided by the generous gift of George B. Door. This station is now devoted to studies of land and fresh water animals and plants. Several more acres of land opposite the Mitchell station were acquired in 1929 by gift of Mr. John D. Rockefeller, Jr., and now serve as a home site for the director. In 1931 Dr. Neal was succeeded by Dr. William H. Cole as director. During the 16 years that the laboratory has been on Mt. Desert Island it has continued its service to biology by offering ever increasing facilities to investigators of the world. Two substantial volumes of reprints of journal articles have been published, and since 1931, 110 abstracts of work accomplished have been published as parts of the annual bulletins. The number of investigators at the laboratory since 1926 has averaged 30 per season and the total number of persons affiliated with the station including families and assistants has averaged 70.

Property and Facilities

The laboratory now owns about 107 acres of land in Salsbury Cove and 11 buildings, including 4 residences, a dining hall and 6 laboratory buildings. All of the laboratory buildings are supplied with fresh water and electricity for heat, power and light, and the marine laboratories with running salt water from a non-toxic system. The equipment includes ample supplies of chemicals, glassware and apparatus for ordinary experimental work in biology. Special pieces of apparatus are provided whenever feasible. Among the more recent additions to the facilities are the following: photographic building for experimental work with light; a repair shop; a new salt water line and pump; equipment of one building for chemical studies; installation of compressed air and an electric water still. The library contains about 1,000 bound volumes, about 5,000 reprints and many of the American biological journals. Books and journals not in the library may be borrowed by arrangement with the Boston Society of Natural History and the Boston Medical Society. For collecting, a 30-foot cabin power boat, the Dahlgren, with cable and equipment for hauling, towing and dredging at moderate depths is available. For work near shore a small motor boat and several row boats are provided.

ADVANTAGES OF LOCATION

One of the chief reasons for maintaining a biological station on Mt. Desert Island is that it allows easy access to the unusually rich collection of animals and plants of the Gulf of Maine, which are so typical of the Acadian fauna extending from Newfoundland to Cape Cod. Around the island and along the shores a great variety of conditions are found, each one especially adapted to certain marine species—rocky surf-beaten shores, muddy coves, gravelly beaches, extensive tide pools, shallow quiet bays, deep sounds, cold water more than 600 feet deep within 20 miles of the coast, brackish streams and bays. Each region is the home of characteristic forms not found south of Cape Cod or north of southern Newfoundland. Not the least attractive feature for the biologist is the large tide which averages about 12 feet during the summer. In addition to its marine fauna the island has a range of bold deeply divided ice-eroded mountains that form a belt across its southern half running east northeast. Their lower sides are clothed by forests and between their peaks rising at the highest to 1532 feet (Cadillac Mt.) are cold water lakes, streams and marshes with rich fresh water fauna and flora. And besides the island lies along the migration route of many birds. Situated in a region of great beauty unspoiled by commercial exploitation or nearness to cities the laboratory has the advantage of being near the wild life sanctuary in Acadia National Park. This secures for all time a permanent and singularly rich area for biological study.

GENERAL INFORMATION

During 1937 the laboratory will be open from June 15th to September 15th.

Applications for use of the laboratory facilities by investigators at the Weir Mitchell and Dorr Stations will be considered on May 1st, and assignments made according to order of receipt and special needs. Requests received after that date may have to be denied due to lack of space. Application blanks and a copy of the 1937 Bulletin will be sent to anyone interested. The blanks should be returned to Prof. William H. Cole, Rutgers University, New Brunswick, N. J., before May 1st, 1937.

The fees for use of research rooms during the summer season including ordinary glassware, chemicals and supplies is $100 at the Weir Mitchell Station, and $50 at the Dorr Station, payable July 1st, 1937. In special cases the Executive Committee may remit part or all of such fees. Applications for remission should be made as early as possible.

Board for those connected with the laboratory and their immediate families will be provided in the laboratory dining hall in Salsbury Cove at $8.00 per week. For others the charge will be $10.00.

Rooms may be found in the neighboring village at reasonable prices.

Salsbury Cove is an old fishing and farming hamlet on the north shore of Mount Desert Island, about five miles from Bar Harbor and on the main road between Bar Harbor and Ellsworth on the mainland, the terminus of the Boston and Maine Railroad. The village of Salsbury Cove is a quiet market-gardening and farming community with its own post office and general store. Bar Harbor has good stores of every sort, an excellent hospital, express, telegraph, cable facilities, bus and boat service.

Those wishing to come to the Laboratory by rail may arrive from Portland, Boston, New York, Philadelphia, or Washington on the Bar Harbor Express over the Boston and Maine Railroad, which will bring them directly to Ellsworth whence a bus runs through Salsbury Cove to Bar Harbor. Convenient rail connections from intermediate stations are served by the Boston and Maine, the Boston and Albany, and the New York, New Haven and Hartford. An airplane line from Boston to Bar Harbor provides rapid service at only slightly greater expense than by rail. Prices of fares, time of departure and arrivals and similar information may be obtained from travel bureaus. Through automobile roads from all sections of New England to Bar Harbor are excellent, with ample facilities for overnight stops.

TRANSMUTATION

Cleaning Fluid Salesman: "Does it take out dirt! Why, lady, yesterday I rubbed a little of this on a copy of Scandalous Stories and when I was finished I had the Sunday School Gazette."

—*Chemical Bulletin*

TCH! TCH!

A tourist in the drought stricken areas of the West this summer, kept hearing a shrill whistle from a grove of trees in which he camped. When he inquired of a resident what kind of birds were whistling in that persistent manner, the native informed him:

"That ain't no birds, mister. That's the trees. They're whistling for your dog!" —*Typing Tips*

MARYLAND

Solomon's Island

CHESAPEAKE BIOLOGICAL LABORATORY

by

DR. R. V. TRUITT

THE Chesapeake Biological Laboratory affords a research and study centre where facts tending toward a fuller appreciation of nature may be gathered and disseminated. Having been established on the picturesque and interesting Solomon's Island, in the very heart of the Chesapeake Bay Country, this laboratory affords unusually fine conditions for instruction in biological subjects, while a gathering place is offered where research may be assiduously pursued by those interested. Such facilities as gas, electricity, salt water, fresh water, compressed air, live boxes, floats, aquaria, and other necessities are provided. In the programme, emphasis is placed on field work and a comprehensive survey of the biota of the Solomon's Island region is being made.

Solomon's Island is situated at the mouth of the Patuxent River, and faces the celebrated Drum Point harbor. The Patuxent is noted for the depth and purity of its waters, and the richness of its biota. The Chesapeake Bay, to the east of the Island, is bounded by beautiful high cliffs, whose out-croppings disclose rich Calvertian fossil beds. Across the bay some ten miles lie the shallow and placid tidewater estuaries of the Eastern Shore, highly productive of many commercial sea foods such as the blue crab and the oyster. Located in this section is the Laboratory's one-thousand-acre Aquiculture Experimental Farm. Over one hundred and fifty species of fishes are found in nearby waters.

The Island is approximately ninety miles from the ocean, and the same distance from the fresh waters at the head of the Bay. Fresh-water streams flow into the Patuxent, and offer ample opportunity for the study of fresh-water biology. The Island may be approached over hard-surfaced roads. Bus lines from Baltimore and Washington connect with Solomon's busses, while the Island may be reached by steamboat from these cities.

This laboratory is state supported and formal study is offered through the cooperation of certain institutions of Maryland and the District of Columbia, namely: Carnegie Institution of Washington, Goucher College,

A Schooner in Full Breeze Dredging Oysters at Solomon's Island, Maryland.

Johns Hopkins University, University of Maryland, Western Maryland College, Washington College, and the Maryland Conservation Department. The policies of the laboratory are formulated and carried out by representatives of these institutions, the presidents constituting the Executive Committee and the following staff members serving as the Committee on Investigation and Instruction: Dr. R. P. Cowles, Johns Hopkins University; Dr. J. D. Corrington, Washington College; Mr. P. S. Conger, Carnegie Institution; Dr. G. B. Moment, Goucher College; Dr. L. M. Bertholf, Western Maryland College; and Dr. R. V. Truitt (Chairman), University of Maryland.

5,000 gallon tanks for experimental study of growth, age and feeding habits in fish. Chesapeake Biological Laboratory.

Living Conditions

Board and lodging are available at the best hotels and inns of this island of some four hundred inhabitants. Married couples may obtain cottages or board, as they choose. The rate varies from eight dollars to thirteen dollars per week for wholesome food and quarters. Arrangements may be made for board at the Laboratory dining room. Modern stores are to be found on the Island, while daily delivery of food commodities, fresh fruits, and other necessities is made from metropolitan centers.

It is suggested to students that they take to the Island a minimum of baggage. Personal effects necessary to activities around the water, such as simple white clothes, slacks, shorts, or other wearing apparel should be included. For collecting trips, bathing suits and old leather shoes are best. Towels, toilet articles, and similar supplies may be secured locally.

WORK OFFERED DURING SUMMER OF 1937

Algae
Physiology
Invertebrates
Economic Zoology
Diatoms
Ichthyology
Experimental Zoology
Biological Problems

Biological Survey of Solomon's Island Region

MATRICULATION AND FEES

Applicants for admission to the Laboratory's summer courses, and those desiring to do research work should communicate with the Director on or before June 15th. Students from the cooperating institutions desiring course work for credit should, in addition, arrange for same through their respective departments of biology, in which established academic and financial requirements must be met. The Laboratory does not issue college credit. It certifies as to quality and quantity of work done directly to the institutions concerned which, in turn, give the credit.

Tagging marine fishes for migration studies. Chesapeake Biological Laboratory.

Applicants desiring credit to meet requirements of a State Board of Education, for certification in school work, should arrange for such credit while registering. No fees are charged for instruction, tables, materials, or supplies at the Laboratory. Highly technical apparatus for special research is supplied only in limited cases. If possible, microscopes should be supplied by students. Boats of different types, and collecting devices are available for field work without extra expense. The maximum load of a student is six semester credit hours during the Summer Session. Graduate students may, if ability to do research has been demonstrated, work on special problems for the entire summer. *Not more than eight students may register for one course.*

Across the Harbor from the Chesapeake Biological Laboratory.

Description of Courses

Below are the descriptions of the courses offered for 1937. This work is for advanced undergraduate and graduate students. Only students qualified to pursue the courses desired should apply for admission.

INVERTEBRATES. *Six semester hours. Prerequisite nine semester hours in Biology.* Lectures, laboratory, and collecting trips to illustrate various significant modifications of the invertebrate types, their structure, habits, and classification. A detailed study of the biology of selected types will be made, and as far as possible local forms will be used.

DR. JULIAN D. CORRINGTON, *Washington College.*

ALGAE. *Three semester hours. Prerequisite, nine semester hours in biology, including six hours in botany.* This course consists of lectures, laboratory and field work dealing with the morphology, cytology, distribution and classification of the marine and fresh water algae of the Solomon's Island region. The laboratory work will include a somewhat detailed study of one or more representative types from each of the main groups as well as briefer comparative examination and identification of related forms. DR. H. C. BOLD, *Western Maryland College.*

Class studying animals from floats and holding cages at the Chesapeake Biological Laboratory.

ECONOMIC ZOOLOGY. *Three semester hours. Prerequisite, nine semester hours in biology, six of which must be in zoology.* Lectures, laboratory, and field trips. Emphasis will be placed on the biology of local forms of commercial importance. Problems of preservation, control, conservation and development of wild forms will be studied. Week-end cruises will be made on the Chesapeake Bay from the Laboratory to the main fishing grounds for oysters, crabs, terrapin, and fin fishes. Observations will be made on the holding, preserving, packing and shipping of commercial forms at Crisfield, Cambridge, Solomons, and elsewhere, as weather conditions permit.

DRS. M. C. OLD AND R. V. TRUITT, *University of Maryland.*

PHYSIOLOGY. *Three semester hours. Prerequisite, nine semester hours in biology, at least six of which should be in zoology.* This course deals with the general physiological activities of animals, emphasis being placed on aquatic forms. Special consideration is given to the physiology of brackish water forms stressing the study of their reactions to variations in specific factors such as temperature and salinity.

Dr. Helen Battle, *University of Maryland.*

Diatoms. *Three semester hours. Prerequisite, nine semester hours of botany.* Lectures, laboratory, and field trips. This course will consist of a comprehensive study of the diatoms, recent and fossil, collected in the region. Also, opportunity will be afforded to examine other than local forms. Special attention will be given to the hydrobiological and oceanographic bearing of diatoms, as well as to the methods of their study, morphology, and economic importance. (Graduate).

Mr. Paul S. Conger, *Carnegie Institution of Washington.*

Ichthyology. *Six semester hours. Prerequisite, nine semester hours of zoology.* Field, laboratory and experimental study of the biology of fishes, including taxonomy and methods for determining age and growth, collecting, preserving and statistical analysis. Except for purposes of classification Chesapeake fishes will be used. (Graduate).

Dr. V. D. Vladykov, *Chesapeake Biological Laboratory.*

Experimental Zoology. *Three to six semester hours. This work is open to qualified graduate students.* Laboratory methods of experimental study of marine invertebrates. The influence of temperature, salinity, and certain other factors on behavior, growth and reproduction will be treated. Molluscs, crustaceans, polychaetes and coelenterates will receive special attention. (Graduate).

Dr. C. L. Newcombe, *University of Maryland.*

Biological Problems. *Credit to be arranged.* Research for qualified persons will be arranged to meet the needs of a limited number of students. Those interested in doing special work should communicate with the Director before June 10th. Before making inquiry about this work, a prospective student should consult with the dean of the graduate school in which he is matriculated for an advanced degree.

Laboratory Staff.

Biological Survey. A biological survey of the Solomon's Island Region is being conducted at the Laboratory. This survey is comprehensive in outline, and planned as a project of several years' duration. All members of the Staff assist as their time permits, in the work of collecting, preserving and classifying the biological material. No credit is offered for the work. However, a fine opportunity is offered to advanced students, instructor, and specialists in biological subjects, for field work and observations on living things in their natural surroundings. Abundant material, both vertebrate and invertebrate, may be collected for winter use in college and high school courses. This work is under the general direction of Doctor Corrington.

Staff Problems

Hydrography of the Patuxent Area—Dr. Newcombe *(Maryland).*

Biology of *Roccus* and *Alosa*—Dr. Vladykov* *(Conservation Department).*

Algae of the region—Dr. Bold* *(Western Maryland).*

Migration and distribution of Blue Crab—Dr. Truitt *(Maryland).*

Diatoms of Solomon's region—Mr. Conger *(Carnegie Institution).*

Life history studies, *Callinectes sapidus*—Mr. Roy Robertson *(Western Maryland).*

Biology of *Cliona celata*—Dr. Old* *(Maryland).*

Sampling methods of water analysis — Drs. Cowles and Bramble *(Hopkins).*

Strobilization and polymorphism in *Dactylometra quinquecirrha*—Mr. Littleford *(Maryland).*

Food analysis in the Striped Bass—Mr. Edgar Hollis *(Western Maryland).*

Physical, chemical and biological fitness of Gun Powder Falls Watershed as a Brook Trout environment—Mr. Fred Seiling *(Maryland).*

Age and rate of growth of *Roccus lineatus* in Chesapeake Bay—Mr. David Wallace* *(Conservation Department).*

Digestive activities in the Rock—Dr. Helen Battle* *(Maryland).*

Certain physio-chemical toleration points in oyster germ cells and larvae —Drs. Truitt and Newcombe *(Maryland).*

For further information apply to R. V. Truitt, *Director,* College Park, Maryland, until June 12th. Thereafter use Solomon's Island, Maryland, address.

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* Dr. Vladykov, fishery biologist, Chesapeake Biological Laboratory, is assisted by Mr. Wallace.

Dr. H. C. Bold, working under the auspices of Western Maryland College, is assistant professor of botany, Vanderbilt University.

Dr. Old is professor of zoology at Ursinus College.

Dr. Battle is associate professor of biology, University of Western Ontario.

MASSACHUSETTS

Woods Hole

THE MARINE BIOLOGICAL LABORATORY

by

DR. MERKEL H. JACOBS

THE primary purpose of the Marine Biological Laboratory is the promotion of Biological Research by supplying facilities to competent investigators and by the cooperation of all interested in improving the means of investigation in the Biological Sciences.

The Laboratory offers facilities for research throughout the year though its full facilities are at present available only during the summer months. Persons wishing to do work at other times are requested to make inquiry in advance as to the extent to which it is possible for the Laboratory to provide for their needs. Investigators are entitled to usual reagents and glassware, to full use of all the general facilities of the laboratory, and to supplies of biological material that can be collected in the Woods Hole area.

Living material which is to be used for research will be furnished by the Supply Department. Investigators are requested in filing their advance applications for laboratory space to indicate as far as possible the live material which they expect to use. This will enable the Supply Department to locate sources for this material and to improve its service to the investigators.

The various laboratory supplies required for investigations, i.e., apparatus, glassware, reagents, drugs, dyes, etc., are furnished by the Department of Chemical Supplies and Scientific Apparatus. This department will endeavor to furnish standard laboratory supplies needed in research work conducted in the Marine Biological Laboratory. Investigators needing supplies are referred to the apparatus and chemical rooms regarding the method of making out orders for such supplies. Unusual apparatus or supplies will, in general, be furnished by the investigators themselves. Photographic materials are available in limited quantities for research work only. Arrangements should be made *in advance* for materials of this character other than ordinary technical chemicals which may be used in photography.

The Chemical Room Staff makes up various fixing, hardening and staining solutions and certain standardized reagents used in ordinary biological and chemical work. It cannot, however, undertake special chemical work for individuals or classes and cannot furnish certain standardized reagents during the period of absence of its regular staff.

The laboratory has a selection of special apparatus in charge of Dr. S. E. Pond. Investigators desiring to avail themselves of the apparatus so set apart should make arrangements as indicated on pages 36-37.

RESEARCH ROOMS

There are 60 private research rooms in the wooden buildings and 94 in the main laboratory. The majority of these are reserved for members of the staff and for subscribing and cooperating institutions. Applications for rooms should be made to the Director, and should state the time of desired occupancy and any special needs. Reservations for the summer months should be arranged for well in advance. The fee for the use of an investigator's room in the wooden buildings for a period not exceeding three months is $100 payable in advance. In the main laboratory the fee for use of an investigator's room for one or for two persons is $200 payable in advance.

RESEARCH TABLES

Ten general research laboratories with accommodations for about 70 are available for beginners in research who desire to work under the direction of members of the staff. Occupants may work upon subjects of their own selection, or upon problems proposed by members of the staff of investigation. Those undertaking research under instruction may elect their instructor, subject to the approval of the latter. The number of students who can be accommodated is limited and admission should be obtained before reaching Woods Hole.

The fee for a table is $50. Applications may be made to the Director, University of Pennsylvania (after May 1, Woods Hole, Mass.), or to other members of the staff.

BUILDINGS

The main research building is an L-shaped four-story structure solidly constructed of brick and cement, about 200 feet long on each face by 50 feet deep. There are in addition four wooden buildings used for laboratory purposes, three buildings used by the Supply Department, a carpenter shop, a mess-hall, dwellings and dormitories and a club-house.

The four-story brick building is substantially built, and fireproof. It contains the administrative offices, the library, technical supply rooms, the auditorium seating 545, and various laboratories including 70 private and general biological laboratories, 15 private and general biochemical laboratories, two biophysical laboratories, six study rooms, five experimental dark rooms, balance rooms, galvanometer room, X-ray rooms, photographic rooms, draughting room, refrigeration plant, cold rooms, etc. Each laboratory room is provided with running sea and fresh water, gas, and electric current. The biochemical laboratories have a chemical desk and hood in addition.

Agassiz Memorial, Site of Anderson School of Biology, Penikese Island, Town of Gosnold, Barnstable County, Mass.

The wooden buildings contain the laboratories for instruction, two laboratories for investigators under direction, and sixty private rooms for the exclusive use of investigators. These buildings are supplied with running sea and fresh water, gas, and electricity.

A sea-water pumping station takes the water from a point where currents and depth insure purity. This water is delivered by electrically driven centrifugal lead pumps arranged for automatic control to cement tanks on the roof, from which it is distributed through lead pipes to all the laboratories. As lead in sea water becomes covered with an insoluble coating immediately, it is believed that the water delivered by this system is practically free from foreign toxic substances.

General Information

The Laboratory was opened in the summer of 1888 for the use of students and investigators in marine zoology. Five departments are now organized for research and instruction, namely, Zoology, Protozoology, Embryology, Physiology, and Botany. Special facilities and equipment for research in Biochemistry and Biophysics are also installed; all kinds of biological research fall within the scope of the Laboratory.

Programs of work may be obtained by addressing the Laboratory, or from the heads of the various departments.

Woods Hole is situated on the north shore of Vineyard Sound, at the entrance of Buzzard's Bay, and may be reached by the N. Y., N. H. & H. R. R. (two and a half hours from Boston), or by rail and boat from Providence, Fall River, New Bedford or New York.

The location of the Laboratory at Woods Hole gives it exceptional advantages for study and research. The shore is varied by necks, points, flats, gutters, bays, and islands; there are numerous fresh-water ponds and lakes in the vicinity; there is no muddy river or city sewage to pollute the sea water; the fauna and flora are exceptionally rich; the climate is especially favorable for summer work; and the place is free from the inconveniences and distractions of fashionable summer resorts.

The completion of the new dormitory and apartment house in 1927 has made it possible for the Laboratory to supply rooms to a considerable number of students and investigators. The prices range from $2 a week for a cot in a room in one of the older buildings with several other persons to $10 for a double room with hot and cold water in the new dormitory and $7 for a single room of similar nature. There are, however, only a limited number of single rooms. Apartments of different sorts are also available, ranging in size from two communicating rooms to suites consisting of living room, two bed rooms, kitchenette, bath, and screened porch. Prices for apartments will be furnished by the Business Manager, Marine Biological Laboratory, Woods Hole, Mass., who will also send to those interested application blanks for rooms and apartments. *It is important that applications for apartments be made as early as possible, as the number is limited. All the applications received up to February 1 will be acted upon together at that time.* In addition to the accommodations offered by the Laboratory, rooms for one or two persons may be obtained near the Laboratory at prices varying from $3 to $15 a week.

Board will be supplied to workers at the Laboratory, the U. S. Bureau of Fisheries Station, the Woods Hole Oceanographic Institution and their immediate families (viz., wife or husband and children) at "The Mess" at $7 a week.*

DEPARTMENTS OF RESEARCH AND INSTRUCTION

The purpose of the Marine Biological Laboratory in offering courses is to aid in the production and training of investigators; it is the intention, therefore, to give first consideration to persons who appear likely, by their intellectual gifts and intentions, to contribute to the advancement of science, whether in biology in the stricter sense, or in medicine, or in any field in which professional biological qualifications are an important factor. The status of the applicant, whether an undergraduate or graduate, may thus be of secondary importance, but other things being equal, preference will naturally be given to the better prepared student.

The Laboratory assigns no grades in courses and sets no examinations. The Laboratory will therefore not certify to attainments in any course, but individual instructors are at liberty to do so on their own responsibility.

Forms of application for admission to courses of instruction will be furnished on request to be addressed to the Laboratory. Applications should be made before May 1, at which time all will be considered together; notifications will be sent out shortly afterwards. Applications for admission to possible vacancies made after May 1, will be acted on immediately up to the date of opening. For the dates between which the various courses will be held in 1937, see the descriptions of the individual courses.

LECTURES AND SEMINARS

The evening lectures, the lectures accompanying the regular courses of instruction, and the botanical seminar are open to all members of the Laboratory.

FACILITIES FOR PUBLICATION

The *Biological Bulletin* is published bi-monthly and provides amply and promptly for shorter papers, requiring only text illustrations.

MICHIGAN

Cheboygan

DOUGLAS LAKE STATION

by

DR. GEORGE R. LA RUE

THE Biological Station for teaching and research in botany and zoology forms a part of the Summer Session of the University of Michigan. Its establishment was authorized by the Board of Regents on April 28, 1909. Beginning with that year it has held a session of eight weeks each summer on the shores of Douglas Lake in Cheboygan County. Here the University owns and maintains for the use of the Station the Bogardus Tract, a forested area of more than 3,900 acres. Lying along the eastern and southern shores of Douglas Lake, it extends south to Burt Lake and has a combined lake frontage of more than six miles.

The nearest village is Pellston, about nine miles west of the Station by automobile road. Through Pellston passes the Pennsylvania Railway and federal highway number 31. About thirteen miles northeast of the Station is Cheboygan, a small city on the Michigan Central Railroad and federal highways 27 and 23. Cheboygan is the express, freight, telegraph, and mail address, while Pellston is the telephone address of the Station. A road, most of it graveled, connects Pellston and Cheboygan and passes near the Station grounds, thus giving access to the improved highways of the State.

This part of Michigan is a region of long, flat ridges separated by low, level areas, and, before the coming of the lumbermen, was covered with magnificent forests of conifers and hardwoods. All the coniferous forests were removed about 1878, the hardwoods more recently. A few small and little-changed tracts of hardwoods still remain. Much of the better land has been cleared for agricultural purposes, but on the poorer lands second-growth forests of pine or hardwood are becoming well established. Within a radius of twenty miles are many lakes ranging in area from a few acres to many square miles. Douglas Lake, which is irregular in outline, is two and one half miles wide by four miles long. Its wooded shores are in some places low, in others rising in terraced bluffs to a height of seventy feet. At the Station the beach is of clean sand and the lake bottom slopes gradually for a short distance and then drops abruptly into deep water. Marl Bay at the northwest end of the lake is shallow and supports considerable vegetation. At some places the beach is stony.

The Biological Station lies in the so-called transition zone between the evergreen coniferous forest region to the north and the deciduous hardwood forest region to the south, thus presenting types of vegetation characteristic of both regions. Three vegetation types are conspicuous, each covering considerable areas. Mixed hardwood-evergreen forests of sugar maple, beech, yellow birch, hemlock, and white pine form the natural vegetation of the better upland soils. Small areas of such forest in virgin condition are still available for study while young forests showing various stages of second growth are plentiful. The poorer sandy soils, formerly occupied by mixed forests of Norway and white pine, are now largely overgrown with aspens, the result of lumbering and repeated fires. Although these trees are small, short-lived, and of little commercial value, they are of great importance in the revegetation of burned-over areas, since they serve as a nurse-crop for the young pines which are springing up as a result of natural seeding. A sizeable tract of virgin pines, known as the Hartwick Pines, located about seventy miles to the south, near Grayling, gives an opportunity to study the pine forests in its original condition.

Swamps and bogs in various stages of development occupy much of the low land. Here are found such trees as white cedar (arbor vitae), tamarack, spruce, and balsam fir. The flora of the bogs is northern in character and includes among other plants numerous orchids, sphagnum mosses, the insect-catching pitcher plant and sundew, and the dwarf mistletoe.

In Wilderness Park, bordering Cecil and Big Stone bays to the west of Mackinaw City, are found especially interesting conditions for ecological and taxonomic studies. Here, in addition to large bogs and sand dunes, are second-growth coniferous and hardwood forests which have escaped the ravages of fire for more than fifty years, permitting ground conditions to return practically to normal. Excellent dunes are also located near Sturgeon Bay and Little Traverse Bay, while at Sleeping Bear, a hundred miles to the southwest, is one of the finest dune areas in the State.

The region offers an excellent variety of vegetational conditions, some original and many others considerably modified as a result of lumbering operations and fire. This affords an unusual opportunity for the development and adequate presentation of various ecological concepts and presents a challenge for the prosecution of many ecological problems.

To the student of taxonomy of the flowering plants, this region offers a wealth of material. More than 1,000 species, distributed among nearly 100 families and over 400 genera, have been recorded. The variety in habitats, such as hardwoods, pine plains, dunes, bogs, swamps, lakes, and streams, affords a diverse flora and offers opportunity for studies in distribution.

Few parts of this country can boast a more prolific cryptogamic flora than the Douglas Lake region. The ferns and fern allies are represented by about fifty species. Of special interest, however, is the large number of bryophytes and fresh-water algae. Thirty genera of liverworts and more than eighty of mosses, comprising a total of nearly 300 species, have been collected here. These include most of the commoner forms of the eastern United States as well as a considerable number of rare and unusual forms. Fully 550 algae, representing more than 100 genera exclusive of diatoms, have been definitely recorded. Upwards of 150 lichens are known, and there is a wealth of slime molds and fungi, as yet scarcely studied.

For the study of animals the wide range of terrestrial and aquatic habitats, including those created by agricultural processes, and the large unsettled or sparsely settled areas offer many opportunities. The fifty species of mammals include several species of small rodents, bats, shrews, moles, muskrat, northern varying hare, woodchuck, raccoon, badger, coyote, red fox, beaver, wildcat, bear, and deer. While the larger species are rarely seen in summer, tracks or other indications of deer, raccoon, and beaver can readily be found.

There are fourteen species of amphibians and sixteen species of reptiles, a number of which are common enough for good collecting. The sixty-three species constituting the fish fauna of the waters of the lakes and streams are well worth study in connection with the fauna of the Great Lakes region. Certain species of fish spawn during July and thus afford opportunity for the study of breeding behavior and embryology.

The study of birds can be carried on to excellent advantage. During the period of the summer session, about 175 species of birds have been identified. These constitute the summer bird population and early autumn migrants. The spring migration is past when the session opens, but before its close many shore birds from the far north may be seen along the lakes. Aquatic environments of the small inland lakes and of the Great Lakes, streams, marshes, cedar-bog forests, cut-over lands, and farm lands are readily accessible. Although the avian fauna is somewhat smaller here than in southern Michigan, it is ample for courses and research, and the location has certain distinct advantages for ornithological study. During the first part of the session nearly all resident species are still nesting. This includes not only numerous kinds well known in southern Michigan but many of the northern nesters that are known to most students only as migrants. Wilderness Park and other wild areas along Lakes Michigan and Huron and about Burt, Mullet, and Black lakes provide excellent conditions for the study of certain birds, mammals, and other vertebrates not available about Douglas Lake.

The invertebrate fauna of the region is rich. Mention may be made of the many species of land and water mollusks, and the numerous smaller crustacea, including the microcrustacea so common in the plankton. The larger crustacea are less numerous than farther south in the State. While Douglas Lake alone offers a fine series of habitats for plankton and bottom fauna, these are greatly augmented by the unusually rich series of habitats offered by such neighboring lakes as Vincent, Munro, Lancaster, Mud, Burt, and Mullet, and connecting waters. A remarkable group of bogs and bog lakes must not be omitted from the list of interesting habitats. Sponges, polyzoans, hydra, nematodes, and aquatic annelids are widely and richly distributed in the region. Insects are plentiful and present representatives of many orders. Terrestrial annelids are less common than their aquatic relatives. The Protozoa and Rotifera have not been studied except as they have been encountered in the plankton, but it is known that these groups are well represented in the fauna.

Parasites are extremely common in the animals of the region. All the vertebrates serve as hosts for parasitic worms, while the numerous invertebrates yield their developmental stages. Opportunities for researches on the life histories of parasitic worms are especially good, since the collection of vertebrate and invertebrate hosts is easy, and a supply of pens, cages, and aquaria provide good conditions for experimentation.

Although the fauna of the region is rich, it is less complex than that in many regions farther to the south. It is, however, adequate for class work and for research. Both terrestrial and aquatic habitats are widely diversified and readily accessible by boat or automobile.

A number of factors contribute to make the Station an unusually good place for study and research. Among these may be mentioned the northern flora, an adequate fauna, an excellent climate, excellent conditions for study, freedom from the intrusion of outside interests, from the limitations of the usual university schedule, from the disturbing conditions of urban life, and adequate opportunity for spending a part of each day in the sunshine and open air in study and recreation—these advantages without the necessity of giving up the essentials for comfortable living.

FACILITIES FOR INSTRUCTION AND RESEARCH

The physical plant occupies about thirty acres of level ground and adjoining hillside bordering the southeast arm (South Fishtail Bay) of Douglas Lake. Two long streets parallel the shore and are connected by cross streets along which the buildings are arranged in three areas: a central campus with laboratories and other buildings of general use, and two residential areas, one at the west of the campus containing forty-three houses and the other at the east containing fifty houses. Groups of houses are set apart for men, women, married students, guests, investigators, faculty, and helpers. The health-service unit consists of dispensary, hospital, and residence for the physician.

Within the campus are nine laboratory buildings with a total of thirteen laboratories, an aquarium, insectary, animal house, library, shop, clubhouse, keeper's residence, and administration building. On the first floor of the administration building are administrative offices and a large combined store and stockroom; on the second floor are a large dining room and a large kitchen. Near the campus are the garage and boathouse with covered harbor.

The equipment of the Station includes launches, outboard motors, rowboats, trucks, various types of nets and seines, traps, aquaria, pens, cages, cameras, field glasses, compound and dissecting microscopes and accessories, microtomes, and a large supply of minor equipment. Five darkrooms are available for photographic work. A good working library is provided.

The bird collection has many nests and eggs, and nearly 700 skins representing over 250 species. The collection of skins and skulls of mammals well represents the mammals of the State. There are many preserved specimens of fish, reptiles, and amphibians. The herbarium includes nearly all of the flowering plants of the region.

GENERAL LIVING CONDITIONS

Conditions for living differ somewhat from those in a city, but all necessary provisions have been made for health and comfort.

Board and Lodging. Members of the Station live in one-room cottages usually equipped to accommodate three persons. Each house is provided with screened doors and windows, heating stove, cots or beds, mattresses, chairs, table, lights, and minor items of equipment. Wood is furnished for the stoves. Blankets, linens, pillows, towels, and toilet articles must be provided by the occupants.

Space in houses will be allotted on April 15 when notifications are sent out, or after arrival at the Station. The attempt will be made to place congenial people together, and friends may reserve space together on application. Students will find the houses ready for occupancy, but they are expected to care for them personally during the session.

The Dean of Women has general supervision of the women's quarters and activities, and is ready to help and advise the women students at any time.

Board is furnished at the dining hall, which is under the direction of a stewardess and a commissary committee appointed by the Director. Members of the Station are not permitted to prepare their own meals. In order to make possible the purchase of supplies at low cash prices each member of the Station must, on registration day, deposit with the stewardess $54 in cash, check, or draft. Those leaving before the close of the session will receive rebate of the unused portion of their deposit.

Field trips by classes are always under the supervision of a professor. Transportation by launch or truck to and from the area to be studied is, with few exceptions, provided by the Station without extra cost to the students. The meals required on such trips are supplied by the commissary. Most field trips are completed within the working day and many of them require no more than half a day.

Health. The climatic conditions and the outdoor life are highly invigorating and conducive to good health. However, should the need arise, any member of the Station is provided medical service by the staff physician who lives at the Station. A one-room hospital is available for any who may need temporary hospital care.

The physician has supervision of matters pertaining to general sanitation and serves as sanitary inspector. The drinking water comes from a deep well and is distributed under pressure to all parts of the grounds. Bacteriological examination shows the water to be safe for drinking purposes. Sanitation is provided by means of a sanitary system with flush toilets and septic tank.

Recreation. A large field is provided for baseball. There are excellent opportunities for boating, swimming, and diving. These sports, together with field excursions, offer sufficient exercise for most students. The clubhouse, equipped with small tables, chairs, and a piano, provides a common recreation center.

Circular of information. Much detailed information with which every person coming to the Station should familiarize himself is brought together in the Circular of Information. In it are discussed such items as mail, express, freight, baggage, necessary personal equipment (detailed lists of bedding and clothing for men and women), and supplies required for courses, and includes an automobile map and directions for reaching the Station by rail, steamship, bus, and automobile. All persons who plan to come to the Station should secure this circular, which may be had upon application to the Director.

INDEPENDENT INVESTIGATORS

Living quarters, laboratory space, and certain types of equipment and supplies are available for a limited number of independent investigators whose scholarly achievements and scientific reputation in the field of biology warrant the extension of this courtesy by the administration. Research may be done on materials brought by the worker or on the local flora and fauna. It is expected that investigators will furnish optical equipment, microtomes, and elaborate or expensive items of equipment. Applications for space should be made to the Director before May 1, indicating fully the character of the problem to be investigated, the equipment, supplies, and other items needed, together with a statement of the housing space required.

FEES AND EXPENSES

The fee for students is $50. This one fee provides for tuition, living quarters, Health Service, and the summer *Michigan Daily.* The fee for investigators who register for the full session is $50. It provides for research space, living quarters, Health Service, and summer *Michigan Daily.* For the dependents of students and investigators who remain for the full session the fee (living quarters and Health Service only) is $15. Investigators and their dependents may register for a part of the session at the weekly rate of $7 for the investigator and $2 for each dependent, plus the required Health fee of $3 for each person registered for more than one week.

Board at the Commissary is $54 for the session.

The total cost for the session, exclusive of traveling expenses and clothing, need not exceed $150. A limited number of students may earn a portion of their expenses by performing certain duties for the Station or the commissary. Applications for such work should be made to the Director at the time of applying for admission.

ADMISSION AND REGISTRATION

Men and women who have satisfactorily completed a year's work of college grade in biological science, involving laboratory work, are eligible for admission. Application for admission to courses should be made before April 15, using the blank which will be provided by the Director on request. Applications will be reviewed on April 15 and notifications will be mailed out shortly afterwards. Applications received after April 15 will be acted upon immediately. Undergraduates not registered at the University of Michigan should submit official transcripts with the application. Graduates seeking higher degrees or expecting to earn graduate credits to be transferred to other institutions are required to register in the Graduate School. Formal admission to the Graduate School may be granted by the Dean at a personal interview or on written application accompanied by full official transcripts of undergraduate and graduate credits. Transfer of credits to other graduate schools cannot be made unless the procedure of formal registration in the Graduate School has been fulfilled. Each application for admission to the Station must be accompanied by a deposit of $12 (check, draft, or money order payable to the University of Michigan). On registration day this deposit will be credited on the registration fee. If the applicant is not accepted, or if he withdraws before June 3, the entire deposit will be refunded. For withdrawal after June 3, or failure to attend, the applicant will forfeit $10.

Enrollment of students will be limited to 100.

Registration will be held on Saturday, June 26, at the Station. Class work begins on Monday morning, June 28, and extends through the full period of eight weeks. Examinations will be held on the last class day for each course.

CREDITS

Since the Biological Station is a division of the Summer Session of the University of Michigan, credits earned there have full value at the University, and can be transferred to other colleges and universities.

ADVANCED DEGREES

Students who have been regularly admitted and registered in the Graduate School of the University of Michigan may carry on work which will count as course and residence credit toward an advanced degree.

The requirements for the various higher degrees are stated in the *Announcement* of the Graduate School. However, since the requirements vary with the preparation of the student, each case will be considered individually by the Dean.

George R. La Rue, Director, The Biological Station, University of Michigan, Ann Arbor, Michigan.

THERE ISN'T TIME

Life isn't long—a mother's song,
And then another's smile,
Then romping feet, and then the sweet
Remembrances awhile.
From gold to gray, from dawn to day,
And then the twilight hours—
Life is too brief to hunt for grief,
For thorns among the flowers.

God's world, God's word, His breeze, His bird,
No hand can rob you of;
Wrong comes too late for hearts to hate—
There is so much to love.
Life isn't long, just time for song,
And love and things sublime.
Be not concerned with thoughts that burned—
Good friends, there isn't time.

—*Douglas Malloch.*

WE'VE SOME NICE OYSTER GROWTHS, LINED ON A ROPE

The lunch-counter man had ambitions to better his station in life and secured employment in a fashionable jewelry store. His first customer was a woman who asked to be shown a lady's wrist watch.

The fellow bellowed lustily: "One Waterbury on a handcuff, female! Who's next?"

"I want a ring," stated the second customer. "Engagement ring, platinum with a diamond about two carats."

"Coming up," announced the salesman. "One tin shackle with a glass eye—two vegetables!" —*Wall Street Journal.*

OHIO

Put-in-Bay

THE FRANZ THEODORE STONE LABORATORY

THE University maintains a Laboratory on Gibraltar Island at Put-in-Bay, Ohio, for the correlation of biology and human welfare. Beginning in 1937 the Laboratory will be operated on a full time schedule as a research laboratory, but with courses of instruction offered only during the Summer Quarter as heretofore. Students may register for research or special problems during any regular University term. All course work taken for University credit will be on a graduate level.

General Information

The Franz Theodore Stone Laboratory is located on Gibraltar Island, near Put-in-Bay, in the midst of the Lake Erie Archipelago. Formerly known as the "Lake Laboratory," it was first opened at Sandusky in 1896. In 1903 it was transferred to Cedar Point and again in 1918 to Put-in-Bay. In 1925 Mr. Julius F. Stone presented the Island of Gibraltar to the University for a permanent Laboratory site and the Laboratory was established there in 1926. In accepting this noteworthy gift the Trustees of the University renamed the Laboratory in memory of the donor's father, Mr. Franz Theodore Stone. Since its opening in 1896 until the Summer of 1936 inclusive, it has been operated only as a summer school.

Reorganization

On October 1, 1936, the Board of Trustees opened the Laboratory on a full time basis, appointing at that time a director and assistant director and authorizing the organization of a research staff for full time duties at the Laboratory. The Director serves also as Professor in the Department of Zoology and Entomology of the University. The Assistant Director holds the position of Chief of Fish Propagation in the State Conservation Division, and is on the staff of the University's Department of Animal Husbandry. The two fish hatcheries located near the Laboratory on South Bass Island belonging to the State Conservation Division and the United States Bureau of Fisheries, respectively, will be operated in cooperation with the Laboratory.

Location

Gibraltar Island, comprising between eight and nine acres, lies in the entrance to Put-in-Bay Harbor. It rises fifty feet above the Lake, precipitously on two sides, and its rocky surface, wherever exposed, bears deep grooves where it was scarred by the ice during the glacial period. There never has been any attempt at cultivation and, except where the buildings stand, the whole island is wooded.

The island has many interesting historical associations. During the War of 1812 it was fortified by Commodore Oliver Hazard Perry and the Battle of Lake Erie was fought near this site. In 1861, Jay Cooke, the great financier of the Civil War period, purchased the island for a summer home and afterward entertained many noted men in the great stone house, known locally as "Cooke's Castle." The property remained in the possession of the descendants until it was purchased by Mr. Stone and by him donated to the University.

The Franz Theodore Stone Laboratory is situated about fifteen miles northwest of the city of Sandusky and about six miles from the nearest point of the mainland, Catawba Point. Put-in-Bay is the most generally accessible island port on the Great Lakes. Steamers usually operate daily from Cleveland, Toledo, and Detroit and there are several vessels each day from Sandusky during the summer season. An automobile ferry makes five trips a day from Catawba Point during June, July, and August. Gibraltar Island is less than a quarter of a mile from Put-in-Bay.

Aims and Purposes

The Franz Theodore Stone Laboratory is dedicated to the development of biological research and the application of its results to the welfare of humanity. The location of the Laboratory is particularly favorable for assistance in rehabilitating the fisheries of Ohio, a food and recreational resource of tremendous potential value to the people of the State and Nation.

Facilities and Cooperating Agencies

The Laboratory is designed to afford the best possible opportunity to investigators, teachers, and graduate students for research and instruction in the biology of the Lake Erie region. More than twenty other islands of the Lake Erie Archipelago are within easy reach by power boat, and many of these present features of special interest, such as rocky shores, pebbly, sandy, and muddy beaches, woodland, field, marsh, and swamp. On the mainland within reach are extensive sand dunes and large marshes.

The fireproof laboratory building, 40 by 90 feet, three stories high, has five general laboratories, one chemical laboratory, darkrooms, library, and fifteen rooms for individual research workers. Water and electricity are in every room, and there are stockrooms with supplies of microscopes, glassware, chemicals, collecting and limnological equipment. The library contains standard books of reference and a large number of reprints.

The Laboratory now serves as the headquarters for research on all fisheries problems of the Ohio Division of Conservation, and the facilities of the State fish farms and hatcheries are available for the research workers attending the Laboratory. Researchers will have opportunities for studying fresh water forms under the controlled conditions of jars, troughs, raceways, and ponds. There are 327 ponds in the 12 inland State fish farms, and these ponds have been assigned the two functions of fish production and experimentation. Soils experts can find facilities for studying the underwater soils and for experimenting with methods of maintaining, raising, or restoring fertility. Botanists and farm crop experts can cooperate in developing methods of managing water plant crops. Geneticists and animal breeders can develop selected strains or other aquatic stocks. Students of animal behavior can observe under optimum conditions many species of aquatic organisms. Students of aquiculture, including fish management, can combine studies of theories and principles with practical experience. The jar hatchery at Put-in-Bay incubates and hatches the artificially fertilized eggs of whitefish and pike-perch, while the inland fish farms produce bass, bluegills, catfish, and bullheads. The Ohio Division of Conservation has inaugurated a program of intensive research on a typical smallmouth bass stream, aiming at the development of a program of fish management for streams. This research is directed from the Stone Laboratory and has its base of operation at Columbus.

The Laboratory also serves as the headquarters for research on the fisheries of Lake Erie. Cooperation by the Division of Scientific Inquiry of the United States Bureau of Fisheries has been assured, and the Ontario Fisheries Research Laboratory has indicated its desire to station one or more workers at Put-in-Bay to study the Canadian fisheries of Lake Erie. The reports of catches of Ohio commercial fishermen have been assembled at the Laboratory for analyses and studies of trends of the fisheries will be combined with studies of the life-histories of the more important species of fish.

Courses of study are offered in Animal Ecology (Dr. V. E. Shelford, University of Illinois), Aquatic Plant Physiology (Dr. B. S. Meyer, Ohio State University), Aquiculture (Dr. T. H. Langlois, Assistant Director), Entomology (Dr. C. H. Kennedy, Ohio State University), Ichthyology (Dr. R. C. Osburn, Ohio State University), and Limnology (Dr. C. J. D. Brown, University of Montana). Only graduate students and specially recommended undergraduates are admitted. Both beginners and experienced research workers are welcome.

Dates of the Session

The six-weeks course of instruction will open on Tuesday, June 22, and will terminate on Wednesday, July 28. Students and investigators may continue their studies after this date and the members of the staff will gladly direct problem or research work. Students desiring to register for any of the regular courses of instruction should arrive on or before June 21. Investigators not desiring credit may arrive and begin their work at any time.

Fees

The University requires all students who register to pay a fee of $10.00 for the six weeks period or $20.00 for the entire Summer Quarter. An additional matriculation fee of $15.00 is required of all students who have not previously matriculated in the University. Independent investigators are not required to pay fees unless they desire to obtain University credit for the work.

Although not specified as a fee, students enrolled in entomology will need $6.50 for insect boxes, books, insect pins and similar equipment.

University Credit

A maximum of fifteen hours credit for the Quarter (June 22 to September 3) will be granted students who satisfactorily complete course or research work for which they are registered. Such students will be expected to continue problem or research work under direction after the six weeks of course work is completed. If a student remains for the first term only (June 22 to July 28), a maximum of eight hours credit is permitted so that a student may register for two four-hour courses. Credits are transferable to other institutions under the usual regulations.

Registration

Registration will be held on Monday, June 21, at the Laboratory.

Dr. D. M. De Long, *Director.*

NEW HAMPSHIRE

Isles of Shoals

MARINE LABORATORY

by

DR. C. F. JACKSON

THIS summer the University of New Hampshire will offer its tenth session of work at the Isles of Shoals Marine Laboratory. The Laboratory is located on Appledore Island, one of a group of eight small islands situated about ten miles off the New Hampshire coast. The work is planned especially for undergraduate and first-year graduate students in biology, although a few investigators of advanced problems can be accommodated.

Because of its location, the Laboratory is an ideal place for the study of marine life. The first impression of the islands themselves is of their barrenness,—rough, irregular rocks jutting up out of the sea. They are covered with a dense growth of low shrubs and herbs, bayberry, blueberry, and poison ivy being perhaps the most common; and many bright colored flowers in the lower areas of the islands. It is impossible to describe the real beauty of the place. The barren wildness surrounded on all sides by the gray sea gives it a charm that is peculiar to no other spot. The island poetess, Mrs. Celia Thaxter, has written: "There is a strange charm about them, an indescribable influence in their atmosphere, hardly to be explained but universally acknowledged."

Of the eight islands belonging to this group, White Island, on which the lighthouse is located, lies farthest out to sea and is the most barren of the group. Indeed it is little more than a rocky cliff, rising sheer twenty-five to fifty feet out of the water on one side, with more gradual slopes on the other. On the east side a bay is formed where floating seaweeds collect and fill the water with color as they are moved about by the tide. There are very few rock pools of any size on White Island. The rocks are smoother and less broken up than on the other islands, and the few pools which do occur are at the low tide level where they are exposed for only short periods. Animal life is abundant around the island. The rocks are covered with colonies of Coelenterates of several species and the waters abound in the common species of fish. From the rocky cliffs on the south side, the bottom drops off rapidly to a depth of nearly two hundred feet. Here are found haddock, hake, codfish, and occasionally one or another species of deep sea sculpin.

Londoner's is the next island and is somewhat larger than White Island. It is almost two islands for there are two high sections separated by a narrow strip of sandy beach largely formed of small pebbles and broken shells. Londoner's is one of the few islands where summer residents live. There is one small cottage on the north section occupied for a few weeks during the summer.

Hundreds of terns nest yearly on Londoner's in the heavy brush which covers the island or in depressions of the bare rocks which form a generous border of shoreline. This colony is composed largely of the common tern, Sterno hirundo, but there are also found a few pair of the more uncommon roseate terns, and last summer several pair of Arctic terns were observed with this colony although it is not known that they nest here. Aside from the terns this island holds little of interest for the biologist.

Star Island boasts of the Oceanic Hotel where summer conferences of the Unitarian Association are held. The island itself is composed almost entirely of bare rock with very little soil or vegetation. There are a few small swampy areas of fresh water on the island to which a lusty colony of frogs claim first rights. The shore drops off rapidly into deep water except on the east side where a breakwater and the neighboring islands make a friendly harbor for fishing ships during the summer. Gosport Harbor is a splendid collecting ground. At the upper end of the harbor nearest the breakwater, depths of only a few feet occur, the bottom gradually sloping into depths of one hundred feet or more near the mouth of the harbor. This is a large sedimentation bay and numerous species of vertebrates and invertebrates are found here which do not occur at any other point at the Isles of Shoals. Within the sheltered waters of the harbor flounders, skate, wolffish, and many species of invertebrates can usually be secured for laboratory purposes.

Cedar is connected with Star Island by a breakwater. It is a small round island with no outstanding characteristic. Two families of lobster fishermen make this their home but apparently disturb very little the animal life which is of interest to the biologist.

Smuttynose—so named because the long ridge of rock which runs out into the ocean appears black to passing ships—is flatter and has a more regular surface than any of the other islands. About a third of the island is a fresh water swamp. The transition from the shore line into deep water is more gradual here than on Star, White, or Londoner's and huge patches of Fucus break the force of the waves which pile up on its shores.

This island is a paradise for the biologist. Its interior is inaccesible to the average visitor and it presents more nearly unspoiled conditions than any of the other islands. Birds of numerous species nest here in abundance, particularly the song sparrow and the spotted sandpiper. During the migration season, many unexpected visitors are found. In the rocky crevices along the shore, Leucoslenia, the finger sponge, and coelenterates of many varieties occur in abundance. Great colonies of hydroids, Metridium, and associations of starfish and sea urchin may be found in the tidepools. Just off shore is a variety of sea bottom ranging in depth from a few feet over Cedar Island ledge, which in fact is exposed at low tide, to depths of nearly fifty fathoms. The bottom is of varying types; sand, mud, bare rocks or dense beds of Fucus. Off the shore of Smuttynose may be found colonies of sea cucumbers, blood stars, Ascidians and many species of interesting deep sea molluscs. A great variety of crustaceans also occur both in the deep water and along the shore line. These include, in addition to lobsters and the common rock crab, the interesting spider crab, deep water hermit crabs, and a great host of palagic forms.

Duck Island is a castoff from the other islands, as it lies about a mile northeast from the rest of the group. It is composed of broken rocks between which are narrow channels or passages. The largest of these rocks is only a few hundred yards in extent. The entire group must be drenched from time to time during periods of heavy storm. This group of rocks is the home of thousands of herring gulls. Their nests and young cover the rocks so that one must walk with care in order not to crush them. During the breeding season the air is filled with thousands of adults when an intruder lands on the island. Their screams can be heard almost continuously day and night at the laboratory a mile distant. There is little in the way of vegetation or other land life on Duck Island. During the migrating season thousands of ducks of various species collect in the vicinity of these broken rocks where they find an abundance of food in the sheltered bays and channels. Duck Island is a wonderful collecting ground for invertebrates, especially those inhabiting comparatively shallow waters. An abundance of fish common to the shallow waters of the Shoals is found here. Cunners occur in enormous numbers and pollock, herring and mackerel are frequently found in the surface waters around Duck Island.

Appledore Island is the largest of the Isles of Shoals group. It is about a mile long and a half a mile wide in its widest portion. It is very roughly triangular in shape, with the apex towards the mainland. The narrowest part and also the lowest is near the northern end, and during bad winter storms is sometimes completely submerged, dividing the island into two parts. Appledore is higher than most of the other islands, the highest elevation being about sixty-seven feet above tide level. The short line on Appledore Island is very irregular. On the west side the rocks are less broken and slope off gradually into deep water towards Portsmouth Harbor. On the north and east shores the rocks are very irregularly scattered and high cliffs drop off precipitously into deep water of narrow ravines or into the open sea.

Along the shore numerous tidepools of great beauty and interest are found. They range in size from tiny crevices that hold the water from one tide until the next to large pools where abundant plant and animal life remain permanently, probably finding better protection than in the pounding surf, yet gaining the benefits of the shallow water. These pools are filled with an abundance of Coelenterates, Molluscs, and other littoral forms.

Vegetation is relatively abundant on this island and many species of shrubs find this an excellent environment. A fresh water pond on the higher portion, and a fresh water swamp at the opposite end give variety to the life that exists here. All of the different forms of invertebrates already mentioned are found in the vicinity of Appledore. Within five minutes walk from the Laboratory the student may find a sufficient amount of material to employ his time for the remainder of the day.

The Marine Laboratory is an outgrowth of the regular summer school work at the University of New Hampshire. The Laboratory was established in 1928 by a group of advanced students in zoology who felt that advantage should be taken of the proximity of the University to salt water. A set of well built, though somewhat neglected buildings, formerly connected with the old Appledore Hotel, was secured. These buildings have been completely renovated and electric lights, running water, and modern equipment have been installed. Owing to the generous support of the University authorities, and with the cooperation of the Star Island Corporation who had control of the land, practically the entire island was leased and now constitutes a large field laboratory.

The Laboratory at the present time has five good-sized buildings, of which one large, well-lighted frame building serves as the main laboratory and classroom building. Many of the classes, however, are conducted almost entirely in the field. In addition, the University maintains a cabin cruiser which is available for collecting trips and work around the islands whenever needed.

As has already been stated, the work of the Laboratory is planned primarily for the undergraduate and first-year graduate student. The student has a choice of any of six lines of work: courses planned to fill science requirements and to arouse interest in elementary biology; courses primarily for pre-medical students; courses in nature study for general students; courses in advanced zoology for students primarily interested in this field; training in methods of teaching biology; and research work, particularly work dealing with marine life.

The Laboratory is open for a period of eight weeks and the University of New Hampshire allows a maximum of twelve semester hours credit for work taken during any one session. Students elect one course and spend all of their time on this course, thus receiving a thorough training in the particular line which they choose. Most of the courses are planned to carry a credit of nine semester hours, since compared with courses taken during the regular year this means at least eight hours per day for six days a week during the session.

The course in principles of zoology offered at the Laboratory is designed to give a practical knowledge of animal life. It is non-technical and adapted to the needs of the general undergraduate student. The nature study work is somewhat more general in nature, planned to give knowledge of biology, including common types of animals and plants and the conditions under which they live. This course stresses ecology of plant and animal life, with study given to types of habitats, associations of life forms, and various ecological factors.

The courses for pre-medical students include comparative anatomy, histology, and embryology. It might seem that a marine laboratory is ill adapted to pre-medical work. However, the students find here an abundance of fresh material for the study of comparative anatomy, comparative histology, and comparative embryology. Furthermore, work in a research laboratory, in contrast to a vocational environment, is of great value to the pre-medical student. Special work in any of these fields, under the direction of the staff, is open to advanced students who may be interested.

The Laboratory is an ideal place to study invertebrate morphology and taxonomy and the work in this field is planned to take advantage of the opportunity for field study.

The work in methods of teaching biology is also planned so that in addition to the survey of materials and methods of presenting biology, the students have opportunity to collect specimens for laboratory and demonstration purposes in their courses.

For more advanced students, the Laboratory is particularly well situated for work in ecology and oceanography. The work offered in this particular field is of an elementary nature, but seniors and first-year graduates are enabled to carry through many independent lines of investigation. The opportunities for research by experienced workers in these fields are very excellent. In addition, there are abundant materials for workers in taxonomy of marine forms and also for those interested in the embryology of marine animals.

The number of students in attendance during a session is necessarily limited by the available equipment. Not more than forty-five or fifty students can be accommodated in a summer. The students live in a group, the men's and women's dormitories being under the guidance of proctors, and the University operates a dining hall where the students secure board at a reasonable price. The staff this summer consists of a group of able instructors from several different schools and universities.

The Laboratory is under the direction of Professor C. F. Jackson, Dean of the College of Liberal Arts of the University of New Hampshire. Dean Jackson directs the general operation of the Laboratory.

The course in comparative anatomy is under the direction of Dr. Norman K. Arnold (B.S., Wesleyan, Ph.D., Yale University), instructor in zoology at Dartmouth College. Dr. Arnold also is available for assistance to any workers in the field of comparative anatomy. He is assisted in this work by Mr. W. Robert Eadie (B.S., M.S., University of New Hampshire) who is instructor in comparative anatomy at the University of New Hampshire.

Dr. Claud D. Williams (B.S., West Virginia Wesleyan, Ph.D., Brown University), at present teaching biology in The Providence Country Day School, has charge of the work in methods of teaching biology. Dr. Williams is a specialist in this line and has had long experience in offering secondary school work.

The work in histology and embryology will be offered by Dr. Lloyd C. Fogg (B.S., M.S., Dartmouth College, Ph.D., Columbia University). Dr. Fogg has had splendid training in these fields both at Dartmouth and under Dr. Wilson at Columbia. His research experience should be invaluable to students interested in carrying out special problems in either of these two fields.

The work in invertebrate morphology and taxonomy is under the direction of Dr. Henry W. Olson (B.S., Otterbein College, M.A., Ph.D., Ohio State University), professor of biology at Mansfield State Teachers' College. Dr. Olson is an authority on annelids and will be of valuable assistance to students interested in invertebrate zoology.

Miss Eleanor L. Sheehan (B.S., M.S., University of New Hampshire), instructor in zoology at the University of New Hampshire, teaches the course in principles of zoology. Miss Sheehan directs the large classes of laboratory work in introductory zoology at the University of New Hampshire.

The work in nature study will be directed by Mr. Herbert W. Jackson (B.S., Dartmouth College) who has had special training in this field at Dartmouth, Harvard, and at Cornell where he is at present a member of the zoology staff. Mr. Jackson is particularly well equipped for this work since for the past ten years he has spent his summers exploring the waters and shoreline at the Isles of Shoals and studying the animal and plant associations found there.

Nothing of originality is claimed for the work of this Laboratory. It is hoped that it will be primarily a stimulus to the young investigator who may go on in productive research. The time may come when our facilities can be increased to accommodate seasoned research biologists. Until that time it is felt that the Laboratory is performing a real service in an attempt to stimulate interest in research work both in students planning to enter the medical profession and those interested in the purely scientific phase of zoology.

A pretty girl at an evening party was bantering a genial bachelor on his reasons for remaining single.

"No-o-o, I never was exactly disappointed in love," he said. "I was what you might call discouraged. You see, when I was very young I became very much enamored of a young lady of my acquaintance. I was mortally afraid to tell her of my feeling, but at length I screwed up my courage to the proposing point. I said, 'Let's get married.' And she said, 'Why, who'd have us?' "

The crazy man succeeds. We sane, normal, standard, regular fellows spend all night reading his biography to learn how he did it.

WASHINGTON

Friday Harbor

THE OCEANOGRAPHIC LABORATORIES OF THE UNIVERSITY OF WASHINGTON

by

Thomas G. Thompson

THE Oceanographic Laboratories of the University of Washington came into being by action of the Board of Regents in March, 1930. The Laboratories consist of three integral parts, namely, the main laboratories on the campus of the University in Seattle, the field laboratories in the San Juan Islands, and the research motorship *Catalyst*.

The campus of the University comprises about five hundred acres and is situated on the shores of Lake Union, Lake Washington, and the Federal canal connecting these two lakes. The fresh water of Lake Union and Lake Washington is connected with Puget Sound by means of one of the largest lock systems in the world. The waters of Puget Sound lead to the thousands of miles of estuaries and inside passages of British Columbia and Alaska and the vast region of the Pacific Ocean. With the sea literally at its gates, it is only natural that the University should be attracted by the many problems of the sea and the abundant life within it.

The staff of the Laboratories is composed of representatives from the several departments of science and includes Prof. John E. Guberlet (zoology), Prof. George B. Rigg (plant physiology), Prof. Clinton L. Utterback (physics), Prof. Robert C. Miller (zoology), Dr. Earl R. Norris (biochemistry), Dr. Rex J. Robinson (chemistry), Dr. B. S. Henry (bacteriology), Dr. Lyman D. Phifer (phytoplankton), Dr. Phil E. Church (meteorology), and Prof. Thomas G. Thompson (chemistry). During the regular academic year, from one half to two thirds of the schedule of most of the members of the staff is devoted to teaching in their respective departments and the balance of their time to research in the Oceanographic Laboratories in their particular specialties. In the summer, the full time of each member is given to teaching and research at the field laboratories in the San Juan Islands. A number of research problems have been initiated during the past seven years, in which two or more staff members have collaborated, and in some of the more extensive studies, all the members of the staff have been concerned.

The work of the laboratories is primarily for graduate students, but many exceptional upper division students have been admitted. All graduate students are majors in one of the several departments as represented by the members of the staff. They fulfil the requirements of the departments of their specialties but their research is under the direction of the major professor in some phase of oceanography. This plan has proved very advantageous in their graduate and research training since the nature of the various problems brings students into intimate contact with one another in the general pursuit of field studies. This gives them a breadth of view and an understanding of problems not directly related to their own specialties, which would otherwise be unobtainable. At times, it has also encouraged students in different specialties to collaborate in furthering the progress of the problems of each other.

The Seattle laboratories were erected in 1931 and equipped from funds provided by the Rockefeller Foundation and the State of Washington. The building is situated on the shore of Lake Washington. Ample wharfage facilities are provided and ready access to the sea is had by the Lake Washington ship canal. A circulating sea water system handling 40,000 gallons is installed in the building. As all the marine life studied is native to the region, the water in the aquaria is maintained at average temperature of Puget Sound, which is about 9° C. This is accomplished by means of a refrigeration system installed in a 1000-gallon rubber lined tank on top of the building. The water is pumped from storage tanks on the ground floor to this cooling tank. After cooling, the water circulates through the aquaria and returns to the storage tank after passing through sand filters. To prevent condensation of the water vapor in the air into the cold sea water of the aquaria with subsequent dilution, the air of the building is partially dehumidified. The piping for the sea water in the building is of rubber, while the storage tanks are of high alumina cement.

The building has three floors and is comprised primarily of research laboratories. These laboratories are available not only to students but also to independent investigators. Due to the general plan of construction, many of the laboratories have practically a constant temperature. All pipes, electrical conduits, ventilators, and flues of fume hoods extend through the middle of the building in the space generally allotted to the conventional hallways. Such an arrangement necessitated placing the hallways along the outside walls and thus resulted in a number of

Oceanographic Building, University Campus, Seattle.

laboratories requiring artificial illumination. This arrangement gave more even temperatures and an excellent control of light for certain experiments.

The field laboratories at Friday Harbor, Washington, which were founded by Professor Trevor Kincaid about 1903 and were developed on the present site largely through the efforts of Professor T. C. Frye, are situated on a 480-acre tract having over two miles of shore line. They comprise seven one-story buildings approximating 65 feet by 30 feet, of hollow tile construction. Two buildings house the work in zoology and one each is allotted to chemistry, plant physiology, general oceanography, and scientific supplies and equipment. The seventh and largest building is shared by physics and bacteriology. All of the buildings are equipped with running fresh and salt water and with gas and electricity. Accommodations are provided for about 150 workers.

Friday Harbor is located on San Juan Island, one of the two largest of the 172 islands comprising the San Juan Archipelago. Besides being a region of marked scenic beauty, it is world-famous for the great abundance and diversification of the marine flora and fauna. Particular mention may be made of the following animals yielding embryological material during the summer months: Obelia, Strongylocentrotus, Echinarachinius, Stichopus, Argobucinum, Melibe, Lacuna, Crepidula, Haminea, Nereis, Polynoids, Amphitrite, Arenicola, Pentidotea, Caprella, Balanus, various Tunicates, and Cymatogaster.

Among the algae available to workers at the laboratories are the following: Browns—Nereocystis, Laminaria, Cymathaere, Agarum, Hedophyllum, Alaria, Pterygophora, Desmarestia, Ectocarpus, Fucus; Greens—Ulva, Monostroma, Enteromorpha, Cladophora, Codium; Blue-Greens—Lyngbya, Oscillatoria; Reds—Porphyra, Iridaea, Gigartina, Callophyllis, Turnerella, Anatheca, Rhodymenia, Halosaccion, Polysiphonia, Odonthalia, Dasyopsis, Antithamnion, Prionitis, Amphiroa, Corallina, Lithothamnion

Most of the these algae are abundant and are readily obtained near the laboratories. Some other large brown algae are found in the vicinity of Cape Flattery. Among these are Postelsia and Lessoniopsis.

The summers in the San Juan Islands are cool and free from disagreeable humid days, while in the winter months, freezing temperatures are seldom reported. In residence at Friday Harbor throughout the year are the curator of buildings and grounds, and the assistant director Dr. Lyman Phifer. The latter has charge of a number of daily scientific observations, the tending of biological experiments being carried over a long period by members of the staff, and the promotion of a program in his charge on the study of marine flora. A detailed description of the laboratories at Friday Harbor has been previously published by Dr. Lyman D. Phifer (Biologist 13, 142-150 (1932); ibid. 12, 5-20 (1930)).

The *Catalyst*, especially designed and constructed, is 75 feet in length, has a beam of 18 feet and a draft of 9 feet, and is powered with a 120 h.p. full diesel engine. A generator, operating from the main engine, and an auxiliary, driven by a small full diesel engine, supply additional power. All winches and equipment are electrically operated. The boat has a cruising range of 3,500 miles, a speed of eight knots, costs slightly less than five cents a mile to operate, exclusive of salary and wages, and since being placed in operation in June, 1932, has covered 35,000 miles. The boat is remarkably free from vibration, it being possible to carry out quantitative microscope counts while under way in a quiet sea. One winch carries three miles of quarter-inch stainless steel cable used for water and bottom sampling and for lighter net operations, while the dredging winch is equipped with about 2,000 feet of half-inch galvanized steel cable. The boat's laboratory has desk space for seven investigators, each desk being equipped with gas, direct and alternating current outlets, and a small duriron sink. Ample shelving and drawer space is provided for numerous reagent bottles and the stowage of special equipment. The laboratory also contains a fume hood, distilled water and fresh water outlets, and running sea water. Besides the main laboratory, there is a small one provided with gas, electricity, and hot and cold water for bacteriological purposes. On the boat there are accommodations available for sixteen people, including the captain, engineer, cook, and deskhand. Members of the staff and their students are assigned various minor duties in connection with the operation of the boat during extended cruises.

The scientific equipment on the *Catalyst* includes a number of water sampling bottles of the modified Nansen type, constructed to contain two and a half liters of water, several dozen protected reversing thermometers and eight unprotected reversing thermometers as well as dredging equipment and a number of different types of nets for horizontal and vertical hauls. A fathometer, registering to 720 meters, is installed in the pilot house. The boat is steered with a photoelectric pilot which is capable of keeping the ship on its course better than the most experienced helmsman. A detailed description of the *Catalyst* was published by the author in the Journal of Chemical Education *13,* 5, 203-209 (1936).

M. S. *Catalyst*

Much of the research is carried on in the Seattle laboratories during the regular academic year and is supplemented by occasional week-end cruises of the *Catalyst*. In the summer months, the activities of the laboratories center about the field laboratories at Friday Harbor. Cruises of the *Catalyst* extend into the Pacific Ocean for several hundred miles beyond the continental shelf and throughout the three thousand miles of inland passages and almost unnumbered estuaries that stretch from Puget Sound to Alaska. Formal specialized courses and seminars in various fields are offered to qualified students at Friday Harbor, and a number of persons from different regions of the country avail themselves of the opportunities. Many professors from other institutions take advantage of the private laboratories and the facilities offered for advanced independent investigators. For furthering the summer work, especially in marine biology, a 60-foot gas boat, equipped with dredging and sampling winches, is chartered for the summer for class field work and for research in the waters of the San Juan Archipelago.

The Laboratories have enjoyed excellent cooperation with scientists in various Government bureaus. A tidal station is maintained in cooperation with the United States Coast and Geodetic Survey at Friday Harbor. A pyrheliometer calibrated by the United States Weather Bureau supplies this organization with data on solar radiation of the region. Observations are made for the laboratories by Captain Erik H. Lindman of the Swiftsure lightship and by Captain S. Atkinson of the Umatilla Reef lightship. The Lighthouse Service not only collects temperature and salinity data for the laboratories but makes periodic net hauls for plankton. Cooperating with the United States Navy, extensive studies have been made in Bering Sea and the North Pacific in the vicinity of the Aleutian Islands, and in the summer of 1935, a line of observations was run from Cape Flattery to the Hawaiian Islands. An extensive phase of oceanographic investigation has been conducted with the United States Coast Guard, and the laboratories have been fortunate in having several officers of this branch of the service attached to the staff as lecturers. Studies have been made of the waters of Bering Sea and Bering Strait with the cooperation of Commander F. A. Zeusler. Dr. Phifer, representing the Laboratories, made an extended cruise with him to study the phytoplankton of that region. Accompanying Dr. Phifer was Dr. Clifford A. Barnes who initiated an intensive physical and chemical investigation of the waters of Bering Sea and the Arctic. This latter work augmented that previously carried out by Dr. Barnes with the Navy. The Laboratories have collaborated with several scientific investigators scattered over the world in the securing of samples and specimens in the North Pacific.

The bacteriological work of the laboratories has been primarily concerned with the physiology of marine bacteria and their relation to the chemical composition of the sea. As a supporting study for these investigations, the types of bacteria which occur in the sea and their distribution under varying conditions of depth, chlorinity, temperature, etc., have been determined.

Three to five graduate students, together with Dr. E. J. Ordal and Dr. B. S. Henry of the department of bacteriology, carry on these studies throughout the academic year at the Oceanographic Laboratories in Seattle, where a completely equipped bacteriological laboratory is maintained. Frequent week end trips are made aboard the *Catalyst* to obtain samples. All the usual bacteriological procedures can be carried on in the main laboratory of the ship during these cruises, and a small planting room, equipped with gas and hot water, is available for work requiring freedom from air currents.

At Friday Harbor, the research program is carried on along lines similar to those followed throughout the year. In addition, a graduate course on the physiology of bacteria is given. Deep sea samples are obtained during this time by frequent trips to the open sea. From these samples, which are obtained from depths as great as 3,000 meters, isolations are made and the deep sea forms of bacteria are studied for their physiological and morphological characteristics.

The botanical and zoological investigations of the laboratories cover a wide and varied field. The plankton work has included studies of the life history of copepods and quantitative analyses of plankton of the inshore waters of the Pacific Coast, in the open sea down to depths of 1500 meters and to points as far afield as the Gulf of Alaska, Bering Sea, and Bering Strait. Botanical investigations have included depth studies of photosynthesis and other aspects of the physiology of marine plants. Zoological researches have included studies of parasites of marine fishes, the embryology of annelids, the morphology and physiology of shipworms, the seasonal distribution of various wharf pile organisms and the distribution of marine invertebrates in relation to their physical and chemical environment. Experiment studies are in progress on the effect of certain types of radiant energy on bacteria and protozoa.

Considerable attention has been given by Professor Miller and his students to the study of marine birds. A number of different species of these birds nest in the islands of the San Juan Archipelago and excellent opportunities are offered for observation at the rookeries. At sea and along the inside passages, opportunities are ever present for the ornithologist. While occupying stations beyond the continental shelf, everyone aboard the *Catalyst* is intrigued by the gony or black-footed albatross which invariably gathers around the ship in numbers varying from one or two to several dozen.

In the summer of 1934, vast numbers of Velella or ''By-the-wind-sailors'' were observed on the sea. They were always encountered throughout the four or five hundred miles of the several cruises off the coast from Washington to Dixon Entrance, Alaska, but only two or three specimens were seen on the cruises of 1935 and 1936.

A great number of dredging operations have been carried on in Puget Sound, the San Juan Archipelago, the inside passages of British Columbia and Alaska to Skagway, in the various bays of the Queen Charlotte Islands and along the coasts of Oregon, Washington, and Vancouver Island. These observations are gradually being worked into monographs by the zoological members of the staff. To meet a popular demand of many laymen, a book recently came off the press, written by Mrs. John E. Guberlet, describing a number of the marine animals of the Puget Sound region.

Field Laboratories, San Juan Islands.

Many types of the fauna of the San Juan Archipelago are not found in the waters of the Gulf of Georgia to the north nor in those of Puget Sound to the south. On the other hand, a part of the fauna found off the north coast of Vancouver Island and in the Queen Charlotte Islands does not occur in the Archipelago nor in the Strait of Juan de Fuca, corresponding rather to the fauna of the northern California coast.

Meteorology is claiming greater attention in the solution of many oceanographic problems. As all the ocean surface is in contact with the atmosphere, any change of the atmosphere will produce some change in surface properties. This change of surface properties may be transmitted to varying depths. Some of the more important meteorological elements which play a dominant role in controlling many of the physical properties, which in turn affect the life of the sea, are the amount, intensity, and penetration of direct and diffuse insolation; the rate and amount of radiation; the effect of plus and minus air temperatures as compared to water-surface temperatures; the amount of heat loss owing to evaporation. All these factors are paramount in determining the temperature of surface and subsurface layers. Evaporation and, therefore loss of water exerts some effect on salinity. The amount and season of precipitation operates toward greater or lesser dilution of the upper layers. The direction, velocity and humidity of the winds present another factor which partly governs the rate and amount of heat and water loss from the surface. Currents, other than tidal, are in a large measure due to wind movement and a combination of temperature, salinity, evaporation and other factors which regulate density. Along coasts, the fresh water discharge from precipitation on land results in the dilution of sea water and in coastal currents. Stirring of surface and subsurface strata are dependent upon wind velocity and direction. These are only a few of the meteorological factors which affect ocean waters. The relation between these factors and life in the sea is so close that meteorology must, perforce, be included within any well rounded oceanographic program.

The laboratories are excellently equipped for researches in the physical and chemical properties of water. Special emphasis has been given to the optical and electrical properties and phenomena, and to investigations in the fields of radiation and radioactivity. Extensive studies have been made of submarine solar radiation during the past five years, using an especially designed photometer which selects several narrow spectral bands. Measurements have been made to depths of over 100 meters on both inshore and ocean waters and at all seasons of the year. A new photometer is now in the process of construction, as the result of a grant recently given Professor Utterback by the National Research Council, which will materially increase the scope of this type of work.

The physical and chemical researches of the laboratories have included refined measurements of the electrical conductivities and the refractive indices of sea water with varying chlorinities and different temperatures. At the suggestion of the International Council for the Exploration of the Sea, careful determinations of density of sea water were made to check the data published in 1901 in the Hydrographical Tables. Samples at various depths for this purpose were collected by a number of expeditions in different parts of the world. A study of the radioactivity of sea water has been made, and the work is being continued with considerably refined apparatus. A broad, preliminary survey has been made of the radium content of material on the floor of the sea, and this is being followed by more inclusive study. The ionic ratios of a number of the predominating ions of sea water have been determined together with quantitative measurements of the distribution of some of the minor constituents of sea water, such as iron, manganese, fluoride, lithium, silicates, phosphates, strontium, boron, etc. A study of the distribution of deuterium in ocean water has recently been completed. Special attention has been given to the study and improvement of the methods for the determination of buffer capacity, carbon dioxide, boron, ammonia, organic nitrogen, and phosphorus, and their distribution in the sea. Numerous observations on temperatures of the waters of Washington, British Columbia, Alaska, and the Pacific Ocean have been made, as well as on the distribution of the nutrient salts. The effects of upwelling off the continental shelf of waters of the Strait of Juan de Fuca and the turbulent conditions encountered in the Strait, the San Juan Archipelago, and Puget Sound have been studied. Due to upwelling and turbulence, the waters of these regions are colder and far richer in nutrient salts than the waters at the same depths in the ocean beyond the continental shelf. This has a very marked effect upon the fauna and flora of the region.

Observations have been made on the Davison current, a cold coastal current that has a generally north of northeasterly flow on the coast of Oregon, Washington, and Vancouver Island. Beyond the continental shelf, the surface waters differ very materially from those of the Davison current, and are characterized by much higher temperatures. This warm water has a southerly trend.

A zone containing just a trace of dissolved oxygen at depths of from 800 to 1200 meters, has been found to exist throughout the greater part of the north and northeast Pacific and in the deeper positions of Bering Sea. Samples taken at different depths from the surface downward show a decrease in dissolved oxygen values until depths of 800 or 900 meters are reached. The surprisingly low values at the latter depths, three per cent saturation, continue for several hundred meters and then gradually increase until twenty per cent saturation is observed at 2500 and 3000 meters. It is interesting to note also that in this zone, the concentration of such substances as boron, phosphates, iron, and aluminum is considerably greater than that of the waters above or below the zone. Indications are, however, that this zone of minimum oxygen does not exist in certain portions of the Gulf of Alaska where the dissolved oxygen decreases steadily with depth to the bottom at 2800 meters.

The studies of the composition of marine plants and animals as correlated with their environment have been in progress for some time. Also considerable attention has been given to the content of carbohydrates, fats, proteins, pigment extractives, etc., in various marine organisms. Researches on the chemical composition and also the vitamin content of some of the marine oils and the vitamin content of some of the marine algae are in progress. Investigations of the nutritional requirements of certain marine fish can be performed throughout the year in the aquaria of the laboratories in Seattle. In cooperation with the Department of Fisheries of the University, nutritional studies have been made on young salmon. Much attention has been given lately to investigations of digestive enzymes and also the enzymes of oxidation and reduction as related to the metabolism of marine organisms.

HUMOR A GREAT SOLVENT

The man who possesses a sense of humor and knows how to use it can have an easy time traveling through the world. After Thomas Lawrence, the young archaeologist, had earned international fame during the World War by the work he had done in Arabia, he returned to England and built a bungalow in Epping Forest, near London, a national preserve. When the authorities told him he had broken the law by erecting a stationary house when the law provides that all buildings in the park must be movable, Lawrence did no arguing. He listened respectfully and wasted none of his own time explaining that his service to the Empire in the East entitled him to some consideration.

Instead, he bought some red paint and with a brush put four wheels on the foundations.

Although the English are not supposed to have a sense of humor by those who do not know them, the authorities looked at those painted wheels, laughed, and left Lawrence alone.

Men with a true sense of humor waste little of their time arguing or explaining.

WEST VIRGINIA

Morgantown

THE UNIVERSITY BIOLOGICAL EXPEDITION

by

LELAND H. TAYLOR

STUDENTS in colleges and universities usually acquire a biological education through a curriculum of specialized biological subsciences. Even introductory courses tend often to be fundamentally morphological or physiological, rather than general. No one would care to dispute the fact that recent and contemporary advances in the biological sciences have been dependent on and have necessitated the extreme specialization of investigators, or that such specialization will continue to be required for much of further progress in our understanding of the living world. The farther the analysis of biological phenomena proceeds, however, so much farther does it lead the professor and investigator, and consequently the student, away from the living world itself. The earlier naturalists, botanists, and zoologists knew this living world, and fortunate, indeed, were the students whom they guided to its more robust and magnificent manifestations. Nowadays plants and animals are largely studied in a dried, pressed, pickled, dissected, microtomized, chemically analyzed, or similarly attenuated state. When specialization cloistered the biologist in his laboratory, *ad majorem gloriam Investigationis*, it emasculated the teacher and shielded the novice from worldly attractions. " . . . The organic world is . . . an inexhaustible source of spiritual and aesthetic delight. And especially in the college we are unfaithful to our trust, if we allow biology to become a colorless, aridly scientific discipline, devoid of living contact with the humanities." Thus W. M. Wheeler, in his presidential address to the American Society of Naturalists, which he calls "The Dry Rot of Academic Biology" (Science, vol. LVII, January 19, 1923), pleads for a return to the "perennial root-stock or stolon of biological science"—natural history, or ecology in its non-technical sense. This profound and witty criticism of academic biology should, I believe, be required reading for every college teacher of biological science.

For various reasons it is difficult to make the physical and mental readjustments necessary to establish introductory courses on an ecological basis, as Wheeler urges. But the establishment in recent years of various sorts of summer field courses must have been a response to similar appreciations of the limitations of conventional classroom and laboratory instruction and of the need of actual contact with the living world. Such, at least, was the chief reason for the organization of the West Virginia University Botanical Expedition in 1926, by Dr. P. D. Strausbaugh, Professor of Botany, for its enlargement into the Biological Expedition in 1929, and for its continuance without interruption as a part of the summer session curriculum.

Studying Aquatic Animals in one of West Virginia's numerous streams.

The itinerant field courses—one in botany, one in zoology—which together bear the name of West Virginia University Biological Expedition are designed to complement and even to serve as antidotes to the biological work of the college year that must be done within the confines of classroom and laboratory. They aim to guide the inexperienced student to the relatively unfamiliar and fascinating living world which, though close at hand, may be beyond his untutored vision. Their purpose is to help the student of biology to discover living things in their native haunts and to direct his attention to the relations of organisms to one another and to their physical surroundings. They offer an opportunity of learning to recognize the major groups of classification and many species of plants and animals in various habitats. Though they make no pretense of being courses in taxonomy, they include practical work in identification and classification in groups that readily lend themselves to such study in the field. Though they can hardly be called courses in ecology, ecological relations are fundamentally stressed. They are truly expeditions, or explorations, not only for the students, but for the instructors as well.

Courses with such objectives will obviously not appeal in general to the graduate student of biology who has already had field training of a similar nature, nor to those whose interest has already become centered on a particular group of animals or plants or on any particular biological problem. They will not always be attractive to the student who is bent on distinction in research as a step towards position or advancement, nor to those unfortunate ones who must depend on text and reference books, on lectures and on formal laboratory instruction for their acquisition of knowledge. It is not that courses of this nature are valueless to such students, for their broadening effects should be salutary assets to the training and experience of any biologist. But they have been especially planned for a class of students—teachers or prospective teachers of high schools or of small colleges —which has a peculiar need for them. This does not mean that they are courses in educational biology, but rather that they present an aspect of biological science which may become a potential resource for more effective achievement in the hands of teachers. Too often a teacher attempts unsuccessfully to adapt or even to repeat his college course in the high school. Even if this were desirable, the material resources of many high schools in the way of books, equipment, and specimens are too meager to promise success. Under such conditions high school courses in biology have often been degraded by the introduction of irrelevant subject matter and devices of questionable biological value or significance. Yet within easy reach of most of our high schools the whole living world of plants and animals is available in its most attractive state. It is only necessary to put into the hands of a teacher the key to this vast source, which he may employ without limitation according to his ability. It is sound, fundamental biology, capable of stimulating interest and arousing enthusiasm in all but the hopelessly inert. It may not solve biological problems to the extent that the more special biological subsciences solve them, but it presents them to teacher and pupil alike, encouraging further observation and perhaps creating an interest in plants and animals which will long outlast the course.

Though designed for teachers because of their special need, these field courses are recommended for rounding out the biological education of all our students who are majoring in botany or zoology. They have sometimes served to create new enthusiasms in students whose interest in biology has waned and have been the means of drawing the attention of some students to problems which they have been inspired to investigate further.

Our itinerant method of conducting the field courses in botany and zoology and our modest instructional facilities prohibit the offering to graduate students and other investigators research work such as is included in the programs of many of the permanently located and larger staffed field stations. Collectors and taxonomists have several times joined our expedition, however, for the purpose of securing specimens and distributional data from the essentially unworked territory through which we travel. We have always extended a welcome to such persons to make use of the facilities of our camps, and have found such associations to be of mutual benefit.

The West Virginia University Biological Expedition travels by means of a bus, a rolling kitchen, and trucks for transportation of baggage and equipment. The trip of six weeks corresponds to the first term of our summer session. Six camps, each of a week's duration, are made in locations of biological interest, bringing within our reach a wide variety of habitats. At these camps tents for sleeping and studying are set up. An electric light plant provides for study after dark. An experienced cook prepares well balanced and adequate, but not elaborate meals. Food is purchased locally and special efforts are made to have variety as well as seasonable, fresh produce. A business manager devotes his entire attention to the smooth running of the physical equipment, the purchase of supplies, and the personal needs of students and staff. Camping conditions are not luxurious, but they are as comfortable and as healthful as we can make them.

A Zoology Class—Ohio River.

The state of West Virginia, to which we confine our trips, has good roads over which we may travel from the flood plain of the Ohio River to the parallel ridges of the Allegheny Mountains—a range in altitude from about 300 to nearly 5,000 feet. Within the state are to be found flora and fauna of Upper Austral (Carolinian), Transition (Alleghenian), and Canadian life zones, all of which may be visited by the Expedition. It is because of this variety of habitat that we have preferred an itinerant field course to a permanently located station. West Virginia is largely mountainous or hilly, with numerous streams of all types and sizes, but no lakes. There still remain a few small tracts of the original deciduous forest, but extensive lumbering operations have left new growths in various stages of development in place of the greater part of this. A portion of the Monongahela National Forest lies in the eastern part of the state. There is an abundance of mountain scenery which is remarkable for its rugged grandeur, and a considerable area which is thinly populated and practically unspoiled by the destructive by-products of civilization.

The rich flora contains more than 2000 species of seed plants; the number of animal species is impossible to estimate. There are, however, about 32 species of Amphibia, 30 species of reptiles, 292 species and races of birds, and 60 species and races of mammals.

The courses in botany and zoology are conducted informally. There is never a large number of students in either. Mornings are usually devoted to field trips either on foot or by bus from the camp. Botanists and zoologists usually work separately, instructor and students visiting places either with definite objectives in view or merely exploring new and unfamiliar territory. On these trips observations are made on plants and animals with special attention to the conditions in which they live. For study and identification collections are made. Afternoons are generally spent in studying the results of the morning trips, comparing notes on observations which were made, and attempting to identify the specimens which were collected. Though we carry a small reference library, chiefly to aid in the identification of plants and animals, we consider that our time can be more profitably spent away from books. Naturally the two instructors do not pose as competent authorities in all groups of plants and animals, and in exploring new locations they often come upon things which are as unfamiliar to them as to their students. This is an advantage of our varying itinerary; it adds zest to field trips and prevents them from becoming routine affairs. Nights may be devoted to more study, but active outdoor life is conducive to early retiring, and the night

A Botany Class.

life of our West Virginia villages is not usually so bright as to keep students from their needed rest.

In the past eleven years the West Virginia University Biological Expedition has offered a welcome and beneficial change from the confinement of classroom to many students and teachers, and the experiences derived from the field courses and camp life have proved to be an inspiration to better work in the fall.

The field courses in botany and zoology are offered for six semester hours of either graduate or undergraduate credit at West Virginia University. Any student who has had a year of elementary college work in botany or zoology may register for the corresponding field course. Work must be in one subject, as no combination of the two is available. The course in botany is conducted by Dr. P. D. Strausbaugh, Professor of Botany and Director; the course in zoology is conducted by the writer.

THE VICIOUS CIRCLE

Here is a French allegory that points a moral worth remembering. A portrait painter sat in his favorite cafe sipping wine. His first small bottle finished, he was about to order another when his eye fell on a headline in the *Figaro*, ''Hard Times Coming,'' so instead of ordering a second bottle he called for his check.

''Is there anything wrong with the wine?'' asked the landlord.

''The wine is good, but I did not order a second bottle because hard times are coming and we must economize,'' explained the artist.

''Hard times?'' said the landlord. ''Then my wife must not order the silk dress we planned, but must take one of cotton.''

''Hard times?'' repeated the dressmaker when the order was cancelled. ''This is no time to expand. I must not make the improvements I had planned in this place.''

''Hard times, eh?'' said the builder when the couturière cancelled the building plans. ''Then I cannot have my wife's portrait painted.'' So he wrote to the artist and cancelled the portrait order.

After receiving the letter the artist went again to his favorite cafe and ordered a small bottle of wine to soothe him. On a nearby chair was the paper in which he had read of hard times a few days before. He picked it up, read more closely, and found that it was two years old.

WISCONSIN

Trout Lake

THE LIMNOLOGICAL LABORATORY

by

DR. CHANCEY JUDAY

NORTHERN Wisconsin is richly endowed with several thousand lakes and lakelets whose basins were formed in one way or another by the ice during the last glacial invasion of this region. The size of these bodies of water ranges from a minimum of an acre or less to a maximum of 4800 acres in Lac Vieux Desert. There is also a wide range in depth, varying from a few feet to a maximum of 115 feet. Likewise the waters differ widely in their physical, chemical and biological characteristics; some of the lakes are landlocked and have very soft water, while a majority of them have regular outlets, with waters that range up to a medium hardness. The waters of a few have no perceptible brown stain in them, while others belonging to the bog type are highly colored. The entire group of lakes, therefore, offers a great variety of aquatic environment to the plants and animals that inhabit them.

In order to obtain a more comprehensive idea of the environmental conditions of the various types of lakes and of their relations to the aquatic biota, the Wisconsin Geological and Natural History Survey established a summer laboratory at the State Forestry Headquarters on Trout Lake in June, 1925. This location was selected because it lies near the center of the northeastern lake district and more than a thousand lakes and lakelets can be reached easily by automobile from the Trout Lake Laboratory. Other considerations were the fact that Trout Lake is the deepest and the second largest body of water in the northeastern lake district and that two buildings which were unoccupied during the summer were placed at the disposal of the Survey for laboratory purposes by the Wisconsin Conservation Department.

LABORATORIES

These two buildings served as temporary laboratories for three summers, but in 1928 the Wisconsin Conservation Department granted permission to occupy two little-used bath houses located on the immediate shore of Trout Lake for permanent laboratories. These two bath houses were remodeled and a third building was erected between them with a grant from the Brittingham Fund. These three laboratory buildings were occupied for the first time in the summer of 1928. By 1930 however, the work had expanded to such an extent that a fourth building was constructed; it served as a laboratory for the research work dealing with fish.

When bacteriological investigations were added to the research program in 1935, a fifth building was constructed for these studies. Grants were received from the Brittingham Fund for the construction of both the fish and the bacteriological laboratories. In 1935 a grant was obtained from the Works Progress Administration for the construction of a general laboratory and a dormitory. These two buildings, like the other five, were constructed of wood, but they are lined inside with wall-board and provided with heating facilities so that work can now be carried on comfortably in early spring or late autumn; they were occupied for the first time in the summer of 1936. The winters are usually severe in the northeastern lake district and no plans have yet been made to continue the investigations through this season of the year. So far the general plan has been to carry out the winter investigations on the lakes in the southern part of the state. For these reasons a more permanent type of laboratory building has not been developed at Trout Lake up to the present time.

Four of the buildings house separate departments of the general investigations that are in progress, namely, chemistry, bacteriology, plankton and fish, while a fifth is used as a general workshop and storage room. The general laboratory which was constructed in 1935-36 is the largest and has room for twelve work tables; the other four laboratories provide for the same number, so that twenty-four tables are available for the investigations. Two research tables are reserved gratis for independent investigators; all of the data relating to the various lakes are available also.

APPARATUS

The laboratory is equipped with boats and trailers for transporting them to the different lakes. It also has deep-sea thermometers, a self-recording solarimeter for determining the amount of solar energy that reaches the surface of the lakes each day and pyrlimnometers which show the quantity of this energy that penetrates to the different depths. Continuous records of the amount of energy penetrating to different depths are obtained with a Cambridge recorder and thermopiles and photoelectric cells for receivers. Light filters are used to determine the spectral composition of the subsurface illumination.

A photoelectric transparency meter is used to determine the relative transparency of the water at different depths; this apparatus is also fitted with a scattering meter to determine the amount of scattering of light due to suspensoids, as well as an electric thermometer for recording the temperature of the water. The specific conductance of the lake waters is determined with a Dionic Water Tester and a U. S. G. S. standard color comparator is used for color readings.

All of the buildings are provided with electric current. In addition the chemistry building has gas and running water, as well as chemicals, glassware and other apparatus needed for the various investigations. Sterilizing apparatus, samplers for both water and mud, and other equipment needed for the bacteriological studies are available.

High speed centrifuges of both the Foerst and Sharples types are used for the plankton work, as well as plankton traps and nets. Different types of dredges are used for the quantitative studies of the bottom flora and fauna, while gill nets and fyke nets are available for the fish investigations.

STAFF

As the research program expanded during the progress of these investigations, the laboratory staff has increased in numbers. During the first summer (1925), the field staff consisted of three biologists and a chemist, with two biologists and two chemists in 1926, five biologists and four chemists in 1927 and seven biologists and three chemists in 1928. Since the latter year the number has gradually increased until it reached 21 in 1935 and 20 in 1936.

COOPERATION

The United States Bureau of Fisheries has cooperated in all of the work that has been done at the laboratory; it took the leading part in the fish investigations in 1927 to 1929, and again in 1931 and 1932. Also the Wisconsin Conservation Department has given liberal cooperation in the various investigations. Financial assistance has been received from the Brittingham Fund, the Wisconsin Alumni Research Foundation and the University of Wisconsin. Several departments of the University have taken an active part in the various studies that have been carried on at the laboratory.

INVESTIGATIONS

The lake waters of the region vary so widely in physical, chemical and biological characteristics that the first task of the laboratory was to make a general survey of a large number of these bodies of water in order to determine the limits of their differences and to see if they could be readily divided into a few typical groups. This inventory was carried out from 1925 to 1930, inclusive. Since the latter year, the investigations have been confined chiefly to a group of six lakes which are good representatives of the major types found in the district. The general survey as well as the more detailed studies have dealt with problems in the following disciplines of science.

Geology. About 40 of the lakes have been surveyed, sounded and mapped, while some idea of the area and maximum depth of about 500 other lakes was obtained in the general survey. The glacial geology of a considerable part of the lake district has been studied and some work has been done on the stratification of the upper part of the glacial deposits in certain localities. The relation of the level of the ground water to that of neighboring lakes has been investigated in a few instances.

Physics. The physical studies have included the temperature and transparency of the water and the penetration of the solar radiation into the waters of various types of lakes. In later years continuous records of the amount of solar radiation delivered to the surface of the lakes and that which penetrates to different depths have been obtained with a recording solarimeter and a Cambridge recorder.

The transparency meter has been used to determine the relative transparency of the water at different depths; the results show some very interesting types of microstratification of the water in the thermocline and hypolimnion of certain lakes. The specific conductance and the color of the water have been determined for substantially all of the lakes that have been visited.

Chemistry. The chemical investigations included quantitative studies of the dissolved oxygen and carbon dioxide, hydrogen ion, nitrogen compounds, phosphorus, silica, iron, manganese, calcium, magnesium, sodium, potassium, fluorine, organic carbon, organic nitrogen, chlorides and sulphates. The majority of these determinations were made at the time the samples were collected; for some of the analyses, the samples of water were evaporated at a temperature of about 70° C. and the residues were analyzed in the chemical laboratory of the University of Wisconsin where polariscopes, microchemical apparatus and other instruments were available for the determinations. Particular attention has been given to the mineral content of the water of Weber Lake, to which farm fertilizers have been added for the purpose of increasing the growth of the phytoplankton.

Bacteriology. Observations have been made on the vertical and horizontal distribution of the bacterial flora of several lakes. The purpose of these studies was to determine the location of the maximum amount of bacterial activity and to determine whether this activity could be correlated with environmental factors. The bacterial population of the bottom mud down to a depth of 50 cm. has been investigated also.

Botany. Quantitative and distributional studies of the large aquatic plants have been made in about one hundred lakes. The photosynthetic activities of some of the large aquatics have been measured for different depths and also for different types of water. Likewise quantitative measurements of the photosynthesis of several species of algae have been made for different depths and for different types of water. All of these measurements were correlated with the quantity of subsurface illumination at the various depths. The quantum efficiency of a pure culture of Chlorella was determined in the summer of 1936.

Taxonomic, distributional and ecological studies of the blue-green and green algae, and of the diatoms are now in progress.

Plankton. Quantitative studies of the plankton have been made regularly since the establishment of the laboratory. Both gravimetric and numerical results have been secured.

In addition to the observations on the plankton of the open water, quantitative and distributional studies have been made on the microscopic forms (psammoplankton) found in the moist sand along the edges of several lakes.

Zoology. A general survey of the sponge fauna of the northeastern lake district as well as in other districts of the state is now in progress. This investigation is being carried out independently by Dr. Minna E. Jewell.

The importance of the bottom fauna as a source of food for fish was investigated in some 50 lakes. In connection with this work also, the amount and kind of food consumed by more than 4,000 fish of several different species were determined. At the same time about 4,400 specimens of fish were examined for external and internal parasites.

One of the chief zoological problems under investigation has been the fish life of the lakes. Fish population studies have been made on a few lakes by means of marking experiments and the rate of growth of several species of fish in different lakes has been determined. The purpose of these growth studies is to ascertain whether there is any definite correlation between the physical, chemical and biological characteristics of the water and the rate of growth of the fish.

Up to the present time, some 70 papers dealing partly or wholly with the results obtained at the Trout Lake Laboratory either have been published or are now in press.

In conclusion it may be said that the general inventory of the northeastern lake district has brought together a very large amount of physical and chemical data on more than 500 lakes; these data serve as an excellent background for the investigation of many ecological and other biological problems relating to the biota of these lakes. These physical and chemical items give a very good index of the aquatic environment under which the various plants and animals have been living for a long period of time.

AN OLD AUTUMNAL STORY

My heart should not be troubled by this thing:
When will it learn that maples gone to flame
Are but the sequel to another spring,
The final syllable of summer's name?
And what the old beech scatters through the grass
Is not of gold, though it appear to be:
My heart should know that what has come to pass
Is but the autumn stripping of a tree.

But always, still, I make too much of these—
Old tales of beeches and of maples burning,
That have another telling in the trees
Of every autumn—and the heart goes learning
Over again its own autumnal story,
From these slow griefs and this brief golden glory.

—*David Morton.*

THE COOING AND THE BOOING

Love and a budget are the two most important factors of a successful marriage, says our favorite feminine columnist. Ah, to be sure! The mating and the estimating. —*Boston Herald*

WYOMING

Laramie

SCIENCE SUMMER CAMP

THE University of Wyoming has been offering, for the past fifteen years, summer field courses in botany, geology and zoology. A diversity of life zones, including plains, foothills, mountains, sub-Alpine and Alpine; a wealth of geological phenomena; and a delightful summer climate are natural advantages which Wyoming enjoys. To facilitate the teaching of field courses and to direct research investigations, the university maintains a field camp in the Medicine Bow Mountains, 35 miles west of Laramie.

University of Wyoming Science Summer Camp—Main Lodge.

The summer camp is built on an allotment of 25 acres set aside by the United States Forest Service for special camp use. The site, which is located in a virgin spruce forest at an elevation of 9,500 feet, was chosen in the belief that it combined the greatest natural advantages of any mountain location in the state. Subsequent experience has demonstrated that a more ideal location would be difficult to find. An improved oiled highway extending westward from Laramie across the Medicine Bow Mountains to Saratoga, Wyoming, passes within a short distance of the camp. Within a radius of ten miles the region ranges in elevation from 7,000 feet to 12,000 feet. The larger part of ths area is easily accessible by numerous roads and trails and offers an excellent opportunity for the study of vegetation and animal types of the various life zones. There are more than a hundred lakes, many hundreds of ponds, and numerous mountain streams within the ten mile radius. Nash's Fork, a vigorous mountain stream, flows through the camp allotment. No region could be better situated for a mountain Biological Laboratory. The Camp is also near the center of an area with a great diversity of rocks, which aggregate more than 50,000 feet in thickness.

University of Wyoming Science Summer Camp—A hydrosere.

The United States Forest Service has recently established the Snowy

Range Natural Area. This virgin area lies adjacent to the University Camp and comprises 771 acres of spruce forest, mountain-meadows, ponds, lakes and streams. In keeping with Forest Service policy, the natural area will be preserved for posterity without exploitation of any kind. Here is a natural field mountain laboratory 771 acres in extent which is closed to grazing, logging, hunting and fishing. Such a laboratory offers unusual opportunities for studying the relations of a virgin forest area to other areas which are open to occupation and use.

University of Wyoming Science Summer Camp—Botany Class and Laboratory, 1936.

The physical plant of the camp has had an interesting history. During the first thirteen years of the project all buildings and other improvements were done by the camp teaching staff and students. Each summer the staff and students, who were granted working scholarships sufficient to cover board, room and transportation costs, spent some three weeks in building enterprises. The original buildings were tent houses. These were gradually replaced year by year by permanent buildings as funds were available. This arrangement has proved very effective and it is hoped that it can be continued, as it has enabled a large number of students, who could not otherwise attend, to get desirable instruction in the various subjects taught. During the past two years marked improvement has been made in the physical plant with the aid of W. P. A. and C. C. C. labor.

University of Wyoming Science Summer Camp—The Zoology Laboratory.

In its present state of development the camp has facilities to accommodate adequately one hundred students and staff members. The central lodge of the camp is a log building 50 feet by 100 feet divided into a recreation hall, study hall, dining hall and kitchen. Students and staff members live in small cabins designated to accommodate two or three individuals. These cabins are equipped with stoves, wash stands, beds with coiled springs, mattresses, quilts and blankets, and study tables. A large shower bath house divided into men's and women's rooms is available at all times. The camp is supplied by an abundance of pure water from a large spring which issues from the rocks adjacent to the camp site. There are four large log laboratory buildings, two of which will accommodate 30 students each. The remaining two will accommodate

12 students each and are reserved for graduate students and visiting scientists engaged in research. A hydro-electric plant furnishes power for lighting and electrical appliances. All buildings are electrically lighted.

The camp instruction staff consists, for the most part, of members of the faculty of the science departments of the University of Wyoming. The Department of Geology, Columbia University sends a representative each season to assist in instruction in a graduate course in geology offered jointly by both institutions. This coming season Dr. Paul B. Sears, Head of the Department of Botany, at the University of Oklahoma, will offer full time instruction at the camp. Dr. Sears' special fields are ecology and the past history of vegetation as evidenced by pollen deposits in peat. He is author of "Deserts on the March". Other professors who will give instruction in botany are Dr. Aven Nelson, Professor of Botany, University of Wyoming, who is the foremost authority on the flora of the Rocky Mountain Region; Dr. W. G. Solheim, Professor of Botany, University of Wyoming, whose special fields are the algae and fungi; and Dr. H. T. Northen, Instructor in Botany at the University of Wyoming. The courses in geology are given under the active direction of Dr. S. H. Knight, Professor of Geology at the University of Wyoming, and State Geologist

University of Wyoming Science Summer Camp—Geology Field Class, 1936.

of Wyoming. Other instructors in geology will be Dr. R. H. Beckwith, Associate Professor of Geology, and Mr. Joseph Neely, Instructor, at the University of Wyoming. The courses in zoology will be in charge of Dr. L. F. Clarke of the Department of Zoology of the University of Wyoming.

Field courses are offered during the first quarter of the summer session. Registration for the camp course for the summer of 1937 will be held at the camp on Saturday, June 19th, and the final examinations will be given on Saturday, July 25th. A maximum of 9 quarter credit hours is allowed in all regular courses. Students attend classes six days a week when enrolled in camp courses. The cost of the courses varies from $102.50 to $133.50 depending upon the number of miles traveled during the course. The travel varies from 400 miles in courses in zoology to 1500 miles in courses in geology. The camp operates a fleet of cars and trucks to transport students and field equipment.

University of Wyoming Science Summer Camp—Class in the Medicine Bow Mountains.

All courses are open to both men and women. Last season the camp personnel, including students, staff and service help, totaled ninety people. The students taking regular courses came from nineteen different institutions. Graduate students, faculty members and others who do not wish to enroll in course work but wish to use the facilities of the camp to enable them to carry on original studies or make collections are accommodated at the student rate of $2.00 per day for board and lodging. Working space in the research laboratories is available for those who wish to carry on independent studies.

The Science Camp has proved a popular place for the summer meetings of various scientific organizations. These meetings have been held at the conclusion of the regular instructional term. Last summer three scientific societies held meetings at the camp, during which approximately 300 guests were entertained.

Each year the University publishes a special Summer Camp Bulletin describing the camp and the camp courses. Anyone interested in learning the nature of the courses offered, costs, etc., can secure a copy of the bulletin by writing to Dr. S. H. Knight, Director, Science Summer Camp, University of Wyoming, Laramie, Wyoming.

FAIR ENOUGH

The defense attorney was cross-examining the witness. Said witness was a fetching blonde with two lovely big blue eyes. The lawyer leaned forward.

"Where were you," he thundered, "on Monday night?"

The blonde smiled sweetly.

"Automobile riding," she replied.

"And where were you," bellowed the lawyer, "on Tuesday night?"

"Automobile riding," repeated the beautiful blonde.

The lawyer leaned still closer.

"And what," he murmured, "are you doing tomorrow night?"

The prosecuting attorney leaped from his chair.

"Your Honor," he protested, "I object to that question!"

The judge, a tolerant gentleman, shrugged his shoulders.

"And why do you object?" he inquired mildly.

The prosecuting attorney drew himself up in righteous indignation.

"Because," he snapped, "I asked her first!"

—Mark Hellinger in *The New York American*

EDITORIALS

The Convention:

IN the leading article which opens this issue of *The Biologist*, Dr. Ortenburger, the national secretary, announces the forthcoming national convention which is to be held during the Christmas holiday meetings of the American Association for the Advancement of Science in Indianapolis.

It is not too soon for every Chapter of Phi Sigma to anticipate the event, but just what preliminary considerations should engross their attentions will be for each of them to decide.

As Dr. Ortenburger says, there are important local matters and still more important national problems that should be considered. One of each of these is well exemplified in the Alpha Kappa and the Zeta Chapter newsletters in this issue. There may be other suggestions, or problems, just as valid, which should be thoroughly canvassed, discussed, and considered in advance of the Indianapolis meeting.

In order to further, as much as possible, a free discussion of all matters which may possibly be advanced at the convention, your Editor places the Fall *Biologist* at your disposal. It will contain a special section on convention agenda. In that section each chapter will be given ample space to announce its suggestions, policies, programs or definite proposals for the convention to consider. Each chapter will also announce its suggestions to the convention's nominating committee for candidates for the offices of National Chancellor now held by Dr. Paul A. Warren (Beta) of Tufts College, and National Treasurer, Mr. E. H. Stewart, (Epsilon), of Mesa, Colorado, which fall open at the time of the convention.

It is needless to add that any statements which reflect on the work of other chapters will be deleted before printing by the Editor.

The Zeta Letter

ZETA'S chapter news letter in this issue gives every member of Phi Sigma food for thought. Although it was originally sent to the National and Chapter officers, it seemed worthy of permanent incorporation in our records, as the profound and measured critique of our national set-up by one of the largest, oldest, and most active chapters in our organization.

There will be chapters which agree with Zeta, and others which will not, but we are reminded of a statement in the April 13th, "New York Times" by Dr. James B. Conant, president of Harvard University. He said: "These are explosive times, and all who are jealous of the rights of free speech and free inquiry are quite properly on their guard to scrutinize every action which seems to jeopardize these principles." For this reason, as announced in the previous editorial we shall be glad to publish every chapter's proposed agenda for the coming convention. If every one knows what lies before the gathering of the clans next winter, we shall more easily appreciate its profound significance.

Zeta Chapter is brutally frank in the expression of its opinions of the National organization, its policies, and its officers. Let other chapters follow this example. "Out of the clash of opinion arises Truth."

Summer Work

THE gratitude of Phi Sigma goes to the officers of the summer stations, laboratories, schools, and courses, who so kindly prepared the articles which fill our special section in this issue.

The specialized summer course in biology with accompanying field work has come to stay in our educational picture. It is one of the most logical outgrowths of our research or training program. The close concentration of teaching duties during the Fall, Winter, and Spring sessions in collegiate surroundings often very remote from nature at its best, in crowded cities and under all sorts of climatic or regional handicaps, prevent that close contact with living forms in field, stream, shore, or woodland habitats which is essential to an adequate understanding of their potentialities or behavior. Hence the summer course. It is to be hoped that the galaxy of opportunities here laid out for inspection will be helpful, if not this year, at least in years to come.

The Alpha Kappa Letter

THERE is a poignant note of impending tragedy in the letter from one of the officers of Alpha Kappa which appears in this issue. While the writer of the letter certainly deserves our sympathy, this is nothing new. The national officers have received many such letters since your editor became associated with the work of the organization. What makes this particular letter so significant is the fact that from a healthy thriving group in one year there should be such a total collapse to a struggling handful. There is always a possibility that purely personal factors are present in a case like this. Only an official investigation could disclose it. More than one organization has been ruined by an unpopular election. The reasons alleged by the non-attendants for their sudden lack of interest do not sound convincing. That such sudden reversals are possible should be a warning to other chapters.

And The Biologist?

THE Spring issue of the 1937 *Biologist* should be in every chapter's hands much earlier than has been usual in the past few years. This is due to the fact that the National Council urged the editor not to wait for chapter news letters. Two sets of identical postal cards were therefore sent to chapter secretaries. The first set went out on March 1st, the second on the fifteenth of the month. The *Biologist* was put in form on the first of April as announced on these cards. If any chapter feels slighted by the omission of its news, this explanation should suffice.

Chapter secretaries are requested not to send in scientific articles for publication in *The Biologist*. Several which were received for this issue have been returned. In the opinion of your editor one of them, which contained the announcements of some interesting research on the poison glands of the Black Widow Spider, should appear at least in summarized form in "Science".

Two colored brethren, who had married on the same day, met for the first time after an interval of twelve months.

"Well, Mose," said Sam, "what so't of a wife did yo'-all marry?"

"Dat woman," answered Mose, rolling his eyes upward ecstatically—"dat woman is an angel!"

"Does you say so?" exclaimed Sam. "Colored boy, you is lucky. My wife is livin' yet!"

She came home with her hat on one side and her clothes obviously crushed and awry.

"Looks as though she's been knocked down by a motorist," said one neighbor, sympathetically.

"Or picked up," said another, somewhat thoughtfully.

CHAPTER NEWS LETTERS

Beta

President—Wayne W. Whitaker, Zoology Department, University of Michigan, Ann Arbor, Michigan.
Vice-President—Irving J. Cantrall, University Museums Bldg., Ann Arbor, Michigan.
Recording Secretary—Lois Jotter, Botany Department, University of Michigan, Ann Arbor, Michigan.
Corresponding Secretary—Joseph P. Harris, Jr., Zoology Department, University of Michigan, Ann Arbor, Michigan.
Treasurer—William Stickel, Zoology Department of Michigan, Ann Arbor, Michigan.

Both active and inactive members of Beta Chapter have felt, for some time, that, unknowingly, a rather static attitude has developed in our activities. Students doing active research have lost interest in the society and have become inactive. Obviously this is a problem confronted by many societies, but the personnel of Beta Chapter felt that this undesirable feature could be mitigated to some degree. It is difficult to draw inactive members back again and so attempts have been made to correct, as far as possible, any feature of Beta's activities which might produce this effect.

Two lines of attack have been inaugurated. Firstly, through the activity of the Program Committee, a variety of programs, intended to appeal to biologically minded individuals, has been developed and presented. These would fall into several categories, (1) historical interest, (2) discussion of current biological problems, (3) presentation of uncompleted research followed by a discussion of problems and difficulties involved, (4) completed but as yet unpublished research, and (5) general interest such as discussion of travel, and biological experiences. Secondly, by careful selection, the Membership Committee has attempted to bring into Beta Chapter interested and invigorating individuals. Especial emphasis has been placed on research abilities.

Dr. A. O. Lee, Professor of Modern Language of the University of Michigan, speaking on the subject "Frontiers of the History of Science and Medicine" gave an excellent example of what could be expected in the line of historical programs. Dr. Lee studied to become a surgeon, but felt a strong need for a knowledge of modern languages among medical students and so has devoted himself to that cause. As a hobby he has delved into the study of old biological manuscripts. His loveable personality and keen sense of humor coupled with an intimate knowledge of the early zoologists made his talk most interesting.

On November 4th, Mr. Arnold Nicholson presented a review of his present research on ''Nesting Habits of *Peromyscus*.'' Mr. Nicholson gave a description of his methods, a review of his results, and a list of perplexing problems which he has encountered in his work. A good discussion followed in which several suggestions were made which may aid in Mr. Nicholson's future work on the problem. Beta Chapter was so satisfied with this program, that others of the same nature have been planned for the future.

The same evening Miss Elsie Herbold gave a most interesting account of her recent trip to Germany. In relating her experiences, Miss Herbold mentioned, in some detail, the methods employed in German Museums.

A Review of Kinsey's ''Origin of Higher Categories in the Genus Cynips'' was given on February 17th, as an example of a current biological problem. A lively discussion followed in which both faculty and students participated. In the opinion of many, the problem involved became understandable and clear cut.

The annual winter initiation was held on January 20th. Dr. H. B. Lewis of the Department of Biochemistry spoke on the topic ''A Chemist Looks at Biology.'' He discussed some of the work being done on plant and animal hormones, especially in regard to structural formulae. His report indicated the confusion and frequent change of opinion as well as some of the interesting and well-proven developments which have occurred in that field. Dr. Lewis emphasized the value of cooperation between chemists and biologists.

Interesting talks, other than those given above as examples of the type of thing Beta Chapter is attempting to do, were:

Dr. Lee R. Dice, Museum of Zoology: ''Some Features of the Natural History of Tamaulipas, Mexico.''
Dr. Dow Vawter Baxter, Pathologist of the School of Forestry and Conservation: ''Alaska.''
Dr. Elzada Clover, Department of Botany: ''Cacti, with Particular Reference to the Taxonomy of the Cactaceae.''
Dr. James Bradbury, University of Michigan Medical School: ''Recent Developments in Endocrinology.''
Dr. Shirley Allen, School of Forestry and Conservation: ''Science, Prejudice, and Conservation.''

It is, as yet, too early to ascertain the returns of these efforts, but indications point strongly toward a positive result. Attendance has been high, several faculty members have put in an appearance at various meetings, and discussion has been increasingly productive. Beta Chapter feels that it is on the road to better service to its members.

The following persons were formally initiated into Beta Chapter in the winter initiations:

Behrmann, Vivian
Block, Walter D.
Brookhart, John
Brown, Barker
Churchill, Helen
Dahlem, Virginia
Ellertsen, Berger
French, Robert
Furry, Frank
Harvey, LeRoy
Heard, Virginia
Hussey, Kathleen
Jenkins, Betty
Klein, Louise
Lillick, Lois
Long, William
Louis, Lawrence
Magaw, David Curlee
Morse, Margaret
Schaefer, Benjamin
Spike, Bruce
Wood, Kendall
Xavier, Sister
Yeager, Lee

IRVING J. CANTRALL, *Vice-President.*

Epsilon

Initiation and banquet for the eleven candidates of Epsilon Chapter was held February 24th, 7:30 P. M., at the Parisienne Rotisserie. The address of the evening was an illustrated lecture given by Dr. John W. Amesse, internationally known child specialist and world traveler, on "America's First Contribution to the Biological Sciences."

The new initiates are: Dr. Margaret Fuller Boos, faculty member, Margaret Tietz, Corrine Anthony, Dorothy Hixon, Catherine Baxter Beck, Virginia Elkins, Howard Olson, Paul Stidham, Edgar Warren, Hugh Capps, and Charles Hanson.

Catherine Baxter Beck has been appointed secretary of Epsilon Chapter to fill the vacancy created by the Resignation of Carol Cox.

The following members of Epsilon Chapter will receive the Bachelor of Arts degrees in June: William Ball, Catherine Baxter Beck, Harland Close, Carol Cox, Wayne W. Kraxberger, Theodore Sowers, Jr., Margaret Tietz, and Gray Wittmeyer. Cecelia Evans will receive Master of Arts degree.

Harland T. Close has been appointed to a teaching assistantship in Zoology at Indiana University for the academic year 1937-38.

Dr. Fred E. D'Amour will attend the meetings of the Biological Federation at Memphis, Tennessee, April 21-24.

Local scientists at the University of Denver are busy preparing to welcome members of the A. A. A. S. and affiliated societies to the summer meeting, June 21 to 26 inclusive.

A general reception for all visiting scientists is to be held at the Mary Reed Library of the University of Denver on Monday evening, June 21.

All Biologists will meet at a six o'clock dinner on Wednesday evening, June 23.

The Chairman of the local committee of the Ecological Society of America, Dr. A. E. Holch, of the University of Denver, states that a series of field trips planned by the society is to be open to members of all organizations represented at the meeting. As tentatively planned there will be an all-day trip to Echo Lake and the top of Mt. Evans (above 14,000 feet), on Tuesday, June 22. A half-day trip to the foothills of Denver Mountain Parks is planned for Wednesday, June 23. A courtesy trip to the foothills together with a barbecue at Golden, Colorado, is tentatively planned for Friday, June 25 (courtesy of the Denver Chamber of Commerce and the Coors Company of Golden). On Saturday and Sunday, June 26 and 27, visitors may have their choice of two trips. One of these is planned in cooperation with Colorado College and other institutions of Colorado Springs, and will include visits to Colorado Springs and Manitou, Garden of the Gods, South Cheyenne Canyon, Pikes Peak, Carnegie Institution Plant Experiment Stations, Government Conservation Stations, etc. The other trip for the same days will include Rocky Mountain National Park, with over-night at the University of Colorado Summer Field Station. The latter trip will include a study of the plants and animals of all altitudes in the region.

Dr. Renaud, Professor of Anthropology, participated in the 125th meeting of the Academy of Natural Sciences on the International Symposium of Early Man in Philadelphia during the week of March 15. Dr. Renaud presented his paper on the "Palaeoliths of Southwestern Wyoming" and their bearing on the antiquity of man. The discovery of and the research work done on the Palaeolithic artifacts by Dr. Renaud has focused scientific attention on Early Man as far west as the Rocky Mountains. Dr. Renaud's recent publication, "Northeastern New Mexico" is the ninth report of the Archaeological Survey of the High Western Plains series to be published by the Department of Anthropology at the University of Denver.

John Lambert Cotter, who received the Master of Arts degree in Anthropology in 1935, has published under the auspices of the Academy of Natural Sciences of Philadelphia, a report on "The Occurrence of Flints and Extinct Animals in Pluvial Deposits Near Clovis, New Mexico," Part IV.

CATHERINE BAXTER BECK, *Secretary.*

Zeta

Biology Bldg,. U. of W.
Madison, Wisconsin.
March 17, 1937.

Fellow Members of Phi Sigma:

The purpose of Phi Sigma, as it is stated in the constitution, is "to promote interest in reseach in the biological sciences." The constitution further states that "an active chapter may be established in any institution of learning which requires for graduation the equivalent of four years of collegiate work and which is equipped with facilities for research."

The earlier chapters of the society were founded at universities where genuine research atmosphere and activity were in existence. In the granting of charters to new chapters in recent years the research opportunities and equipment have apparently not weighed as heavily in the selection as they did formerly, with the result that some of our present chapters of Phi Sigma can boast of only a few active members actually engaged in significant, productive research. What is to be the future policy of the society in this respect—more and more new chapters with less and less regard to genuine research atmosphere and facilities, or fewer new chapters with a greater insistence on bona fide and adequate research activity and equipment? Should chapters be established in schools that do not *require* research as a part of the work leading to a degree? These are matters of policy that must certainly interest everyone who has the future of Phi Sigma at heart.

The constitution at present permits the initiation of any student "who has shown special ability for research work and who has received an equivalent of at least two years of college credit." Under ordinary circumstances it is rare that a first-semester junior student has reached the point in his training where his background and technical training fit him for undertaking a research problem requiring any degree of critical analysis or of special skill in the manipulation of research equipment. Are we safeguarding the fundamental purpose of Phi Sigma by permitting the initiation of members before they know at first hand what research is, before their ability has been demonstrated in action? This also is a matter that those interested in the progress of Phi Sigma must consider.

Another important consideration in the upholding of Phi Sigma's usefulness is the question of the relation of the national organization to the individual chapters. How can it be kept responsive and responsible to the total membership? How can its activities be planned so as to be of maximum benefit with the least burden on the individual chapters?

Of primary importance is the need for making the central organization more responsive and responsible to the will of the general membership. In glancing over the roster of our present National Councilors one is impressed by the fact that three out of the six are not located where they can attend meetings of a Phi Sigma chapter, and that four of the six came originally from Beta chapter. Granted that these men have the interests of the society at heart and have given of their time and effort to its advancement, is it in the long run a good thing for the society to have its national officers so far removed from the present active, working chapters, and so largely chosen from the same original group? Should there be developed a method of nominating and electing national officers that will insure a more active participation of the local chapters in the process? The present method is for the chancellor to appoint a nominating committee chosen from the delegates at the convention, who must in the course of a very short time draw up a list of candidates for the several offices. Would it not be better to call for nominations, accompanied by statements of personal history, training, and qualifications of the nominees, from the chapters some months prior to the convention? And let these be turned over to a nominating committee which could then prepare a slate that could be distributed in advance to the chapters in a calendar of business issued a month or so before the convention? This would enable the chapters to give their delegates more definite instructions regarding their preferences. Coupled with the privilege of nomination from the floor, this would seem to present a more democratic method of choosing the national officers than does the present system. It would seem desirable also that the next convention consider adopting resolutions providing for a wider distribution of the national officers among the chapters and a more active relationship between them and the individual chapters.

The main activities of the national organization are the holding of conventions, and the publication of the *Biologist*. These necessitate the spending of a considerable sum of money raised by collecting $5.00 from each new member at the time of his initiation, and $2.00 annually from active members. These fees are in many chapters much higher than are the local fees, but the main benefit derived from the organization, most members will agree, is that obtained from the programs and contacts of the local chapter. Are the conventions and the publications of the society as they are now carried on sufficiently important and valuable to justify this high fee? Could they not be modified and curtailed in some way without loss of their function or their effectiveness? Let us consider several possibilities:

Should the *Biologist* attempt to be a scientific journal, or would a simple, semi-annual business statement suffice—published perhaps in a mimeographed form, and containing only reports of the secretary and treasurer, lists of officers and new members, calendars of convention business, brief chapter reports, et cetera? There are many who doubt whether the present elaborate and expensive set-up of the *Biologist* is really accomplishing enough in the way of stimulation of research and biological education to justify the expense involved. The operation of a genuine scientific journal is quite beyond the possibilities of the society, the general membership is too young, the scholastic duties of members too demanding, the overturn in personnel too rapid to justify the attempt to publish a serious scientific journal. Since this is true, is the publication of a journal with semi-popular addresses, brief book reviews, and general statements by the national officers sufficiently important to the progress of the society to warrant the high dues required to maintain it?

Is it necessary to have conventions every two years and to pay all the transportation expenses of the delegates to these conventions each time they are held? There is much to be said for handling the business of the society by mail referendum as was done during the first ten years of the society's history. The proposals thus receive the consideration of the full membership of the society instead of only a handful of delegates. They must be thought out and drawn up in careful form before presentation to the chapters. Some of the delegates to recent conventions have come away with the distinct impression that the convention is an expensive and ineffectual method of transacting the society's business.

If the convention plan is to be retained would it not be sufficient to have a general convention (with delegates having their transportation expenses paid) only once every four years? Annual scientific sessions could still be held, if they were desired, and an annual meeting at which the affairs of the society could be discussed without taking any formal action. At least a month ahead of the general convention the agenda should be distributed to all chapters so that delegates could be properly instructed in advance after discussion of proposed legislation with their fellow chapter-members. Then, too, at conventions the pressure of time and the arguments of proponents of particular ideas sometimes end in the passage of rules and regulations which a general referendum might turn down. Would it not be advisable, then, for all business transacted at the convention to be reported back to the chapters for ratification by a majority of them?

Finally, can anything be done to improve the scientific sessions for the reading of papers, held in connection with the AAAS meetings. A more judicious grouping of subjects and advance publication of abstracts would probably help. The length of the sessions could be reduced by encouraging those who can do so to present their papers before other scientific groups. This would leave the Phi Sigma meetings open principally to those who, because they are not members of other societies, have only this opportunity to present their papers before a scientific audience and enjoy the benefits of its criticism.

Zeta chapter feels that these matters are of sufficient importance to the society to justify a careful discussion by the individual chapters before the next convention, and a critical consideration by *properly informed and instructed* delegates on the floor of the next convention. We would like you to take these matters up with your chapter, and, if possible, give us a report of your feeling on the matter. If there are enough other chapters which share these sentiments, Zeta chapter intends to bring them before the next convention.

To summarize our message, we should like to hear your opinion on these points in particular, as well as any others upon which you would like an expression of views:

(1) qualifications for the admission of new chapters;

(2) possible improvements on the method of nominating national officers, to insure the representation of as many chapters as possible and a closer association of the national office with the active chapters;

(3) more democratic means of transacting convention business (as, for example, by the advance publication of agenda, the sending of instructed delegates, etc.);

(4) reduction in the expense of the *Biologist* by limiting published material to national business and by employing a less elaborate format than that which is now in use;

(5) possible improvement of the scientific sessions.

Sincerely yours,

SANFORD ATWOOD,
President of Zeta Chapter.

Iota

President—Russell J. Seibert, Theta Xi House, Washington Univ., St. Louis, Missouri.
Vice-President—Priscilla Chinn, Zoology Dept., Washington Univ., St. Louis, Missouri.
Secretary—Ruth E. Peck, Missouri Botanical Garden, St. Louis, Missouri.
Treasurer—David F. Waugh, Zoology Dept., Washington Univ., St. Louis, Missouri.

The following persons were initiated into Iota Chapter, March 3, 1937:

Ammerman, Elizabeth
Brenner, Louis G., Jr.
Buder, Jessie
Coldwater, Dr. K. B., faculty
Cross, Ollie H.
Ellis, Calvin C.
Erganian, Jane
Frei, Catherine
Gayer, H. Kenneth
Goerger, Verne F.
Gollub, Sam
Grave, Caswell II
Hamburger, Dr. Viktor, faculty
Hubricht, Leslie
Johnson, George Thomas
Jones, Asa C., Jr.
Keefe, Eugene L.
Kinder, Jimmy
Larsh, Howard W.
Lodewyks, Maude C.
Manewal, Charlotte Josephine
Moreland, Joe
Myers, Jack E.
Ownbey, Francis Marion, Jr.
Percival, John E., Jr.
Rehm, Carol Henry
Schechter, Samuel E.
Schreiber, Ruth
Smith, Marian
Thym, Dr. Henry P., faculty
Whisnand, Florence E.
Ziegenbusch, Herman H.

RUTH E. PECK, *Secretary.*
Iota Chapter, Phi Sigma.

ISAAC OCHOTERENA nació en Atlixco, Estado de Puebla, el 28 de noviembre de 1885 es hijo del finado Coronel Pedro Ochoterena, quien brillantemente se distinguió combatiendo con heroísmo al lado de las

fuerzas liberales mexicanas en la campaña contra franceses y austriacos, y de la Señora Virginia—Mendieta Vda. de Ochoterena, descendiente de uno de los hermanos de Fray Jerónimo de Mendieta.

Hizo sus estudios, capitalmente, en la Escuela Nacional Preparatoria y ha prestado después sus servicios como Inspector de Educación Pública en el Estado de Durango; Profesor de Química y Biología en el Instituto Juárez del mismo Estado; Director General de Educación y Profesor de Biología en San Luis Potosí; Profesor de Biologí y Jefe del Departamento de Ciencias Biológicas en la Escuela Nacional Preparatoria; Profesor fundador de la Cátedra de Embriología en la Facultad de Medicina; Jefe de la Sección de Biología Vegetal y Embriología en la extinta Dirección de Estudios Biológicos; Profesor de Histología en la Escuela de Medicina Veterinaria, etc. Actualmente es Director del Instituto de Biología de la Universidad Nacional de Mexico; Profesor de Histología y Biología en la Facultad de Estudios Superiores y Profesor fundador de la Cátedra de Histología y Embriología en la Escuela Médico Militar.

Instituciones científicas a que pertenece:

Nacionales: Academia Nacional de Ciencias "Antonio Alzate"; Sociedad Mexicana de Geografía y Estadistica; Fundador de la Sociedad Mexicana de Biología; Honorario del Hospital Morelos; Profesor honorario de la Escuela Médica Michoacana; Academia Nacional de Medicina; Primer Presidente del Consejo de la Educación Superior y la Investigación Científica.

Extranjeras: Academia Nacional de Medicina de Lima, Perú; Sociedad Micológica de Francia; Sociedad de Aclimatación de Francia; Sociedad Botánica de Lyon; Sociedad de Biología de Concepción, Chile; Sociedad de Botánica Aplicada de Leningrado; Physikalischen-Medizenische Gesellschaft de Würzburg, Alemania; American Society of Tropical Medicine; Sociedad Española de Historia Natural y Academia de Ciencias Excatas, Físicas y Naturales de Madrid.

Según la Bibliografía formada por el Señor Silvio Ibarra Cabrera, el Profesor Isaac Ochoterena, lleva publicados 179 trabajos hasta el año 1936.

Entre estos trabajos se cuentan 25 estudios de Biología; 33 de Botánica; 11 de Zoología, 67 de Histología entre los cuales 29 versan, especialmente, sobre la Histología del Sistema Nervioso, y 43 sobre asuntos diversos: notas biográficas y bibliográficas necrológicas, estudios psicológicos, etc.

La Bibliografía del Prof. Ochoterena representa una labor de más de 30 años de estar dedicado a las investigaciones científicas.

Lambda

President—Karl Conklin, 500 University Ave., Missoula, Montana.
Vice-President—William Trosper, 405 So. 3rd St., W., Missoula, Montana.
Secretary—Frank Stanton, South Hall, Missoula, Montana.
Treasurer—Helena Eck, 539 University Ave., Missoula, Montana.

Lambda Chapter found itself almost defunct last fall due to the graduation of most of its members, including officers. Shortly after the opening of school in the fall election of officers was held by the remaining few members. The first part of the term was necessarily devoted to organization and the selecting of new members.

Speakers have been: Dr. L. T. Evans—Embryology: "The development of the Cochlea in the Gecho"; Dr. G. A. Matson—Bacteriology: "Blood Groups in Mummies"; Robert Sommerville—N. Y. A. director: "Biological aspects of N. Y. A."; Dr. Foss—Physician: "Allergy."

Initiation of nine new members February 16 was carried out by the six old members. After the formal initiation a banquet was held. Those initiated were: Mary Clapp, Zoology; Elaine Frogner, Home Econoimcs; Wilemina Kurth, Home Economics; Robert Walker, Forestry; Laurence Osburnsen, Forestry; James Whilt, Forestry; Vernon Marsh, Zoology; Hervey Sannan, Pre-med.; Theodore Walker, Zoology.

FRANK STANTON, *Secretary.*

Mu

Mu Chapter's fall initiation was held on November 11, 1936. For a change, the affair was formal. Dr. Chaney of the Paleontology Department was our toastmaster, and Dr. Van Dyke of the Entomology Department talked to us about the necessity of field work in research. The following people were initiated:

Muriel D. Boelter
Gary T. Brown
Mont A. Cazier
John R. Clark
Bessie B. Cook
Clyde H. Coombs
Paul H. DeBach
Olive P. Dyer
Mary E. Garthwaite
J. Linsley Gressitt
Leonard I. Katzin
Barbara C. McIvor
Eleanor J. Moles
Lorin J. Mullins
David E. Price
Nancy Robinson
Louis A. Riehl

Our first meeting this semester was a dinner meeting on February 9, 1937. Dr. Amy N. Stannard of the Infirmary Staff spoke on "Certain

Aspects of Psychiatry." Everyone was interested and many questions were asked.

On February 23, 1937, our second meeting, which was an evening meeting, was held. New members were elected. Dr. W. V. Cruess of the Fruit Products Department spoke on "Enological Studies".

Our spring initiation was held on March 6, 1937. Dr. H. L. Mason of the Botany Department was toastmaster. Dr. Olmsted of the Physiology Department told us about the Friendship of Claude Bernard and Louis Pasteur, and showed us snapshots he had taken of Claude Bernard's home and of other things connected with his life. The following people were initiated:

Walter S. Mangold (faculty)
Jacob Fong
Anthony J. Glazko
Lucile M. Hook
Hugh B. Leech
George F. Manson
Jean H. Mundell
L. Clark Nattkemper
Jane Nold
Col. Geo. A. Skinner (faculty)
Robert D. Ray
William B. Richardson
Edward S. Ross
Elizabeth B. Schmidt
Isaac L. Schechmeister
Glenwood M. Spurlock
Harold Swerdloff
Daniel F. Thomas
George F. Warner

We will have two more meetings this semester. At the next one the election of new officers will be held.

Dorothy M. Fowler, *Secretary.*

Nu

On March 25 Nu Chapter of Phi Sigma sponsored the showing of several reels of film having traumatic surgery as the subject. The meeting, open to all pre-medical students, was packed to overflowing. The intricate phases of the film were explained by Dr. Donehoo, a local surgeon.

Nu Chapter has been meeting bi-weekly, at each meeting to hear a paper prepared through the research of an individual member.

We have already chosen four superior students whom we will take into the society next year. The announcement of their names will be made before the student body at a special scholarship day convocation.

Edwin P. Albright, *President.*

PI

At the January meeting of Pi Chapter the following were initiated as active members: Thomas A. Hart, Frances McCalla, Morris S. McKeehan, A. Y. Napier, and Julius B. Wager. Miss Mary Linda Vardell of Agnes Scott was initiated into faculty membership.

After the initiation ceremony, Dr. E. H. Runyan of Agnes Scott gave a very interesting report on his work on the ecology of desert plants in Arizona.

At the March meeting Dr. J. K. Fancher spoke on the endocrine glands.

Our treasurer, Norman H. Giles, has recently been awarded the Lewis H. Beck Scholarship which will enable him to do three years' graduate work at any university of his choosing. One such scholarship is offered each year by the Beck Foundation to a student of Emory, Agnes Scott, or the University of Georgia. Pi Chapter is proud of the fact that she has furnished two of the last three winners of this award. The other winner was Burness E. Moore, who is now studying medicine at Harvard.

Four members of the chapter will be candidates for the master's degree in June. These are Venetia Cook, working on the life history of *Blepharisma undulans;* J. B. Wager, working on methods of transmission of rat bite fever; A. Y. Napier, working on sex determination in *Arisaema triphyllum;* and H. E. Brown, working on the effects of X-rays on *Blepharisma* and *Paramecium*. Thomas A. Hart will be a candidate for this degree in August. He is doing his research on the life history of *Vorticella*.

H. Eugene Brown, *Secretary.*

Tau

President—Kenneth Garren.
Vice-President—G. W. Wharton.
Secretary—Sarah Culbreth.
Treasurer—Catherine Goffin.

Since the last news letter was sent in, Tau Chapter has initiated ten new members. These were John Ayers, J. F. Mangrum, D. M. Brown, C. E. Riddle, E. M. McNeill, Yen-Chieh Wang, Douglas Nesbitt, E. W. Ligon, Miss Delphine Dowling, and Miss Catherine Goffin. These members were initiated at the annual banquet December 9, 1936 The banquet was held in the Union banquet hall, with G. W. Wharton presiding as toastmaster. Dr. A. S. Pearse was the principal speaker. His subject was ''The Environment and Life''.

In January this chapter began a series of programs conducted alternately by faculty and student members. Meetings are held every other Monday night. On the first Monday of the month, a faculty member, or guest speaker addresses the group. On alternate nights, the meeting is turned over to one, or two, students, who report on work they have done, or are at present engaged in. In this way much discussion has been stimulated, and a good deal of interest in the meetings has developed.

At the last meeting of the chapter officers for next year were elected.

At this meeting several new members were considered. Six of these were elected to membership and will be notified immediately. These were Misses White and Wilkinson, Messrs. McDermott, Korstian, Blades and Williams. We sincerely hope that these people will accept the bid to membership in Tau Chapter.

There are at present 45 active and alumni or faculty members who clamor for the *Biologist* whenever it comes out.

Recent publications by faculty and alumni members of Tau Chapter:

C. G. Bookhout. The Germ Cell Cycle in the Guinea Pig.
Zeitschr. f Zellforschung und Microskopische Anatomie. Bd. 25. 1937.

F. G. Hall and F. H. McCutcheon Hemoglobin in Amphibia.
J. Cell. and Comp. Physiol. Vol. 9. 1937.

T. S. Coile. Root Distribution of Piedmont Forest Soils.
Journ. Forestry. In Press. 1937.

.... Forest Soil Problems in Piedmont Plateau Regions.
Journ. Forestry. In Press. 1937.

.... Composition of leaves of forest trees.
Soil Science. In Press. 1937.

Mildred Stites Reed. The Genus Cyperus in North Carolina.
J. Elisha Mitchell Sci. Soc. Vol. 52. 1936.

P. J. Kramer. The relation between the rate of transpiration and the rate of absorption of water in plants. Am. J. Botany. Vol. 24. 1937.

Lewis Anderson. Mitochondria in Life Cycles of Certain Higher Plants.
Am. J. Botany. Vol. 23. 1936.

F. G. Hall, with David B. Dill and E. S. G. Barron. Comparative Physiology in High Altitudes. J. Cell. and Comp. Physiol. Vol. 8. 1936.

Ruth M. Addoms. Nutritional Studies in Loblolly Pine.
Plant Physiology. Vol. 12. 1937.

H. S. Perry and G. F. Sprague. A second-chromosome gene, Y_3, producing yellow endosperm color in maize. J. Am. Soc. Agronomy. Vol. 28. Dec. 1936.

B. Cunningham and A. P. Hurwitz. Water absorption by reptile eggs during incubation. American Naturalist. Vol. 70. 1936.

Sarah Culbreth, *Secretary.*

Upsilon

In December we initiated the following new members:

Joe Burnett
Betty Peoples
James Fisher
Fred Barr
James Eley
Richard Howard
James Cattell
Mary Anna Farley
George Gries
Ray Martz
James Harris
Hubert Bezdek
Russell Reaver

We welcome as our new sponsor Dr. Crowell, who just recently received his Ph.D. at Harvard. His presence is a great source of aid and inspiration to our society.

At present we are making plans for our annual field trip to some locale rich in biological interest.

June Hake, *Secretary.*

Phi

President—Eleanor Sheehan, Zoology Dept., University of New Hampshire, Durham, N. H.
Vice-President—Alfred Chandler, Commons, University of New Hampshire, Durham, N. H.
Recording Secretary—Patricia MacLeod, Bacteriology, University of New Hampshire, Durham, N. H.
Corresponding Secretary—Joseph Naghski, Bacteriology, University of New Hampshire, Durham, N. H.
Treasurer—Mary Tingley, Horticultural Department, University of New Hampshire, Durham, N. H.

Dr. Moses of Medfield State Hospital, a former graduate of the University of New Hampshire, addressed the Pre-medical students at the annual "Pre-Med. Night" sponsored by the Phi Chapter of Phi Sigma. All enjoyed his descriptive talk and will profit by his suggestions.

The annual Spring Mountain Trip will be held May 1. This will be a week-end outing in the White Mountains.

JOSEPH NAGHSKI, *Secretary.*

Chi

President—Margaret Boetcher, Chi Omega House, Bozeman, Montana.
Vice-President—Edwin Alderson, 716 South 6th Street, Bozeman, Montana.
Secretary-Treasurer—Wayne Lenz, Lewis Hall, Montana State College, Bozeman, Montana.

On March 1 Chi Chapter initiated the following:

Louis Clayton Allard
John Francis Buzzetti
Veda Chloe Jacobs
Retta Mae Buchanan
Peter Henry Matisheck
Harold Hunter Scudamore
Ray Roberts Woodward

After the initiation ceremony we had a banquet at Hotel Bozeman in honor of the new members.

In January Chi Chapter sponsored several interesting films of the wild life of the Rocky Mountains to which the public was invited. The films were well received and we hope to be able to show more in the near future.

Psi

This year it has been our purpose to present a comprehensive review of the question of evolution, both organic and superorganic. Our speakers have been recruited from our biology faculty and have included Dr. Melville Hatch, who gave the first of our series of lectures on the history of evolution from the time of the Greeks; and Dr. Robert Miller, whose subject was "Evolution in the Animal Kingdom". Our next speaker represented the School of Pharmacy, and, although this was not strictly speaking following our theme of evolution, Dr. James Dille's speech on the "Historical Aspects of Pharmacology", gave us an excellent recapitulation of the long life of that science. Through their speaker, Mr. Jones, the botany department showed us the ways in which evolution has changed the plant kingdom through the ages. Our final speaker on superorganic evolution has not yet been announced, but we are all looking forward to seeing our theme for the year well rounded off.

Herewith is the report of the activities and the new members of Psi Chapter of Phi Sigma for the school year beginning October 1936 and ending June 1937. It does not include those members elected this month to be initiated in April.

Newly initiated members:

From the School of Forestry: Richard Grant, Robert Craig, Floyd Dickinson, Melvin Twerdal, Martin Hendrickson, Arthur Mottet, Donald Bailey, O. Harry Schrader, Jr., Charles Simpson.

From the Department of Bacteriology: Dale Mills.

From the Department of Zoology: Margery Myers, A. Henry Banner, Falconer Smith.

From the School of Pharmacy: Richard Budd, L. W. Hazelton, Raymond Ahlquist, Minora Masuda.

From the Department of Physiology: Ruth Leedham (Mrs. Frederick Medack).

From the Department of Fisheries: Clifton Miller.

MARGERY MYERS, *Secretary.*

Omega

President—Mildred Pool, Department of Zoology, Univ. of Okla., Norman, Oklahoma.
Vice-President—Pauline Hoisington, Dept. of Bot., Univ. of Okla., Norman, Oklahoma.
Secretary—Mildred Hawkins, Dept. of Botany, Univ. of Okla., Norman, Okla.
Treasurer—Arthur N. Bragg, Dept. of Zoology, Univ. of Okla., Norman, Okla.

The following members were elected last November and initiated on November 19th:

Armstrong, Catherine
Aurin, Fred
Bank, Edward
Boswell, James
Bradbury, Dorothy
Corbin, Vera Lue
Cross, Forrest
Frings, Mabel
Frings, Hubert
Goldsmith, Mrs. Alcy
Harris, Lee Ellen
Harrison, Stearley
Hitchcock, Waldo
Hopkins, Dr. Milton
Hull, Dr. Wayne
McClellan, Charles
McClellan, James
Merkle, John
Powell, Paul
Power, Maxwell

Dr. A. O. Weese has been appointed chairman of the Committee on the Preservation of Natural Conditions of the Ecological Society of America. Dr. A. I. Ortenburger is secretary of the same committee.

Dr. Paul B. Sears will be on the faculty at the University of Wyoming Summer camp, Centennial, Wyoming, this summer. The University of Oklahoma's field course at Camp Innisfree, Lyons, Colorado, during August will be under the direction of Dr. G. L. Cross.

Weekly programs of the Norman Forum for the month of April will be devoted to conservation. The speakers will be Dr. Paul B. Sears, Dr. A. O. Weese, and Mr. Charles Smith. Dr. Sears has been appointed by Governor Marland as a member of the committee on soil conservation for the state.

Dr. Milton Hopkins will leave June 9th for a summer's trip through England where he will visit various herbaria.

Dr. Ralph Bienfang, assistant professor of pharmacognosy, has been given charge of the old pharmacy garden and has laid it out into beds, each of which will be devoted to a drug plant.

Mr. and Mrs. Hubert Frings are working on the cytology of the poison glands and the embryo of *Latrodectus mactans.* They are also conducting light and color reaction experiments on spiders. The research collection of the museum is being put in order by Max Powers. Charles Smith is studying the relation of roads to erosion. He has found frequent gullies of 20 feet in depth that have been initiated by road construction. Since the beginning of the second semester, O'Reilly Sandoz has been assisting in paleontology. J. R. Carpenter will return from Oxford, England, to America by way of Asia. While in Russia he will visit ecological stations there. Since last September Julian Howard has been an assistant in botany at Tulane University. Mary Connor is taking a technician's course at the University Hospital in Oklahoma City, Oklahoma.

There are many interesting papers being published by our members.

Dr. G. L. Cross: The structure of the growing point and the development of the bud scales of Morus alba. *Bull. Torr. Bot. Club.* 63: 451-465. Nov. 1936.

The origin and development of the foliage leaves and stipules of Morus alba. *Bull. Torr. Bot. Club.* 64: 145-163. 1937.

The morphology of the bud and the development of the leaves of Viburnum rufidulum Raf. *Am. Soc. of Bot.* (in Press).

Dr. Milton Hopkins: Arabis in Eastern and Central North America. *Rhodora.* 39: 63-98. March 1937. (running serially). To appear as a Contribution from Gray Herbarium of Harvard University.

Miss Margaret Kaeiser: Anatomy of the Seedlings of Althaea rosea. *Pro. Okla. Aca. of Science.* (in Press).

Phi Sigma is sponsoring its annual Biology Round-Up April 17th. Dr. Robert E. Woodson, Jr., of the Missouri Botanical Garden will speak on "Behind the Scenes of a Flora of Panama" at the Phi Sigma banquet following the initiation of new members. The following people were elected for our spring initiation:

Aldredge, William Max
Bowen, Rosemary
Eskew, Cletis
Flood, Bill
Fullenwider, Charles
Garrison, Martyna
Sister Constance Grace
Hilseweck, W. J.
Hopkins, Glenn
Joseph, Earle
Macdonald, Robert Geo., Jr.
McKinnon, Jeanne Elise
Mundie, Dr. J. R.
Pottz, Glenn E.
Smith, Paul
Tappen, Helen
Van Valkenburgh, Alvin M.

Mildred Hawkins, *Secretary.*

Alpha Alpha

President—Dr. Harry L. Bauer, Santa Monica Jr. College, Santa Monica, California.
Vice-President—Jack Remple, University of Southern California, Los Angeles, California.
Corresponding Secretary—Dorothy Pool, 341 W. Raymond, Hawthorne, California.
Recording Secretary—Caroline Barnes, University of Southern California, Los Angeles, California.

Alpha Alpha Chapter of the University of Southern California presents the following new members initiated February 12, 1937:

Roberta Jane Fouratt
Dorothy Fay Ellinwood
Douglas Bothwell
Rena Barnett
Mary Allan Scott
Louis Hoffman
Eva May Hyde

The initiation banquet was held at the Town and Gown, on the campus. Dr. O. L. Sponsler, of the University of California at Los Angeles, was the guest speaker. He gave an illustrated talk on "A Molecular Aspect of Protoplasm".

On March 12, an illustrated lecture on "Coloration in Desert Reptiles" was given by Dr. Raymond B. Cowles, of the University of California at Los Angeles. His lecture was illustrated with natural color (AGFA) lantern slides.

Jack Remple, our vice-president, has recently left with the Hancock Expedition. He will be engaged with botanical work while on the expedition.

On April 13, we are planning a field trip to Laguna Beach.

We expect to have Dr. Munz, of Pomona College, with us at our banquet meeting in May.

In all, the members of Alpha Alpha Chapter believe that it is going to be a somewhat better than average year for Phi Sigma in Southern California.

DOROTHY POOL, *Secretary.*

Alpha Beta

Alpha Beta Chapter of Phi Sigma has been enjoying a most successful year. We have had some very interesting meetings including a talk on Mexican art by Miss Louise Morris of Cleveland. At our initiation in December, Dr. Carl Johnson, a graduate of Mount Union and a member of Phi Sigma, who has been doing research work in Panama spoke to us on diseases found in the Panama district. At our initiation held in March another member of Phi Sigma and a graduate of Mount Union, E. R. Chandler who is now a professor at Chester High School in West Virginia gave us a lecture on ''These Last Few Years''. On March 18, Phi Sigma sponsored a lecture given by Dr. Howard W. Haggard, the author of ''Devils, Drugs, and Doctors'', ''The Doctor in History'' and many other books. Dr. Haggard's topic was ''Recent Discoveries in Medicine and Their Significance''. The remainder of our meetings will be devoted to papers given by various members of our chapter.

Initiates for the year 1936-37 in Alpha Beta are:

Brady, Martha Jane
Bryden, Robert Richmond
Corbin, Billy Lee
Drake, Lena Jane
Dugan, Jane Elwilda
Ellis, Thomas K.
Evans, Ellen Neff
Freshwater, Nancy Eleanor
Gilcrest, Robert Allen
Greenamyer, Donald Lee
Haines, Richard DeWayne
Hunter, Francis Edmund
Kilgore, Bessie Jane
Maggiore, Carl Humbert
McFadden, Cornell Inman
McGrew, Ila Gaynelle
Nieberding, Ramona Elizabeth
Nims, Jayne Elizabeth
Pickens, Eleanor Josephine
Ross, Edwin Francis
Sanderson, Elsie Jane
Schwartz, Norman Alvin

Hantz, Herbert Luther
Heckaman, Raymond Tod
Hess, James Alfred

Scott, Ruth Agnes
Stamp, Jane Keith
Wearstler, Mary Elizabeth

BETTY AYERS, *Corresponding Secretary.*

Alpha Epsilon

We have not had much that might be termed eventful this year. Our initiation is not until next month, so no news about that till then. The following is a list of the papers of importance given so far:

"Purposes and Intents of Graduate Research", W. R. Root, Dean of Grad. School, University of Pittsburgh.

"Graduate Work and Research", O. E. Jennings, Head of Dept. of Biology, University of Pittsburgh.

"Recent Research in Biochemistry", C. G. King.

We have had in addition one meeting given over to reports on research by members of the Society.

Here's hoping that *The Biologist* coming out will be as good as those in the past.

HARRY J. LIPMAN, *Secretary.*

Alpha Eta

President—Marion F. Spore, 713 College, Stillwater, Oklahoma.
Vice-President—Alvin Kenworthy, Horticulture Dept., Okla. A. & M. College, Stillwater, Oklahoma.
Secretary-Treasurer—Bill J. Frederich, 713 College, Stillwater, Oklahoma.

Alpha Eta Chapter at Oklahoma A. & M. had quite a wide variety of subjects to discuss during the fall and winter of the current school year.

The College has reorganized the Science and Literature Department to some extent by putting in a well-rounded pre-medical course. Also several new professors have been added to the biological science departments.

The Oklahoma Academy of Science had its annual meeting at Oklahoma A. & M. Dr. H. J. Harper, of the soils department and one of our faculty members, was president of this group during the past year through its meeting here. Susan Fry, one of our active members, gave a paper before the group on pollen grains.

Plans are being laid for a spring initiation soon. The following persons were initiated into Alpha Eta Chapter, December 9, 1936:

Wilson Brant
Susan Fry
Gene Hubbard
Willis Johndahl
Raymond Kays
Helen Long
Roy Murrell
Richard Schultz
Gerald Steelman

BILL J. FREDERICH, *Secretary.*

Alpha Kappa

My dear Editor:

Unfortunately our Chapter will not be able to contribute any news to the *Biologist.* However, we should like to appeal to you for help. Alpha Kappa is dying. The cause? Perhaps just the fact that we are located in a large city, with too many opportunities at our feet.

Last year (1935-1936) attendance at our meetings ranged between 50 and 100. Our speakers were some of the most well-known research workers in the field of science. In May, we foresaw a bright future ahead of us. Yet, in October, and ever since, practically no one has attended our meetings. This slump has been so marked that we now feel we cannot ask any well-known speaker to devote his evening to about ten people.

Our more recent members have failed to support the Chapter. They claim that they cannot spare the time from graduate work, or their newly attained positions. Their plea is, "Of what value is Phi Sigma? We thought that its purpose was to further scientific research." Yet, how can we further scientific research? How do other chapters further scientific research?

Heretofore, we have felt that meetings at which famous speakers told us of their work served to inspire our members to further endeavors, but the largeness of our city and the opportunities it offers have defeated us. We can no longer compete with the more powerful scientific organizations here, in providing interesting speakers. How else can we justify our reason for existing?

You might suggest that our own members be urged to present their work. Most of our members turn to teaching as a means of securing the funds to carry on graduate work. By the time they succeed in returning to the laboratory, they have long since ceased attending meetings. Others who do succeed sooner, often leave the city to teach in colleges in other states, and are, hence, lost to us, and so the tale proceeds.

The most practical way of furthering research would, of course, be to supply the facilities for our own members to carry out some simple tasks. This would, perhaps, be our salvation. Yet, we have no room of our own, and we cannot afford to hire and equip one with the funds secured from our incoming members. Must our chapter, therefore, die? The organization means so much to the undergraduates at Hunter. These slave to gain membership. For this reason, if for no other, some of us have been almost frantically attempting to keep Alpha Kappa alive. (In fact, we shall attempt to elect undergraduates to membership, but to what avail?)

Has any other chapter successfully faced a similar situation? How do other chapters manage to inspire their members to scientific endeavors?

As the only remaining active officer, I am appealing to you for suggestions on how we could "hold our own". Do you know of any chapter which might be able to offer us advice on "how to survive?" What is the answer to, "of what value is Phi Sigma?"

Need I say that we should be more than grateful for an answer?

Very truly yours,
(Miss) Alwin Winstein, *Secretary.*

1456 Wilkins Ave., New York, N. Y.

Alpha Lambda

Alpha Lambda recently held one of its most successful initiations and banquets at the University Union Building. The following were initiated:

- Rouvoe Cushing
- Cyril Fullmer
- Dr. Seville Flowers
- Virginia Gledhill
- Mary Erickson
- Edward Evans
- Herbert Gold
- Harold Jonson
- Roy Spear
- Dr. Gladys Relyea
- Frank Worthen
- Albert Grundmann
- Edward Midgley
- Paul Nielson
- Barbara Quinn
- Maire Kaye

Our treasurer recently received a Government appointment in Range management. We are quite proud of Mr. Dilworth Marchant. Mr. Perry Plummer, our former chapter president, has held a similar appointment for a year. Dr. Harold Austin, a former active member is finishing his internship soon. And so it goes. Members of Phi Sigma are successful with a very high percentage. We are proud of them.

We agree heartily with your idea of how the future National Conventions should be conducted. You may depend on the support of this chapter.

ESTELLA C. MARCHANT, *Secretary.*

Alpha Mu

Alpha Mu Chapter's activities opened with a meeting on October 21 at which Dr. Kenneth L. Gordon, assistant professor of zoology, gave a talk on his doctor's thesis research done on learning of wild animals and birds.

Pledges were elected at the next meeting on November 17. For the pledging, held in early December, a pledge ritual was used for the first time by this chapter. It is a part of pledge duties to write a paper of about 500 words on a special phase of the student's interest in biological research. Some very fine papers were received and the one by John Pierson, included as a part of this report, was read at the initiation banquet on January 13. At the dinner Dr. W. J. Chamberlin, associate professor of entomology, was guest speaker. His subject was ''Ticks and their Economic Importance''.

New members are:

Elston Bell
Clara Jane Chapman
Frederick Cramer
Harry J. Endicott
Gilbert C. Finlay
Robert C. Holloway
Jay Long
Mildred Packard
John Pierson
Robert Rieder

Alumni notes: Noal Larson, past president, is now studying for his doctor's degree at Iowa State College, at Ames. Tom Taylor, last year's treasurer, and Max Parrot, last year's vice-president, are attending the Oregon Medical school at Portland. Warren Bailey is teaching in the high school at Nyssa, Oregon.

Alpha Xi

President—Joseph Callahan, Lambda Chi Alpha House, R. I. S. C., Kingston, R. I.
Vice-President—Jeanne Bonjour, Cranston, R. I.
Secretary—Atheline Capalbo, Bradford, R. I.
Treasurer—Vincent Turco, Westerly, R. I.

Alpha Xi started its year's activities with a business meeting in October. At this meeting possible candidates for membership were selected. At an evening meeting in November, sixteen new members were initiated. At this time also an excellent bit of research on Tobacco Mosaic was presented by a member of Alpha Xi.

Alpha Xi has had a very notable group of speakers this year. Among them were Dr. Rankin who spoke on "The Ecology of Parasites," and Father Ahearn who spoke on "Evolution versus Religion." Dr. Virgilio, an alumnus of R. I. State College gave a series of talks on anatomy. Dr. Hunter, a member of the faculty, also spoke.

A successful Saturday Nite dance was sponsored by Alpha Xi in January. Our annual banquet will be held in May.

Our last meeting will be a business one at which new members will be elected for next year. Alpha Xi is looking forward to a new year of many efforts and good results.

Atheline Capalbo, *Secretary.*

PISCATORIALLY SPEAKING

A pure form of vitamin D has been produced which is worth four times its weight in gold. But don't tell anyone in Washington. They might put the country on a cod-liver standard, and the 59-cent dollar is fishy enough.

—*Monsanto Current Events*

LIFE BELTS—AHOY!

The fog was very thick, and the Chief Officer of the tramp steamer was peering over the side of the bridge. Suddenly, to his intense surprise, he saw a man leaning over a rail, only a few yards away.

"You confounded fool!" he roared. "Where the devil do you think your ship's going? Don't you know I've the right of way?"

Out of the gloom came a sardonic voice.

"This ain't no blinkin' ship, guvnor. This 'ere's a light 'ouse!"

—*DeLaval Monthly*

BOOK REVIEWS

Reviews printed here represent the candid opinions of various readers, not necessarily those of the members of the National Council, nor even those of the Editor.

THE A B C OF ATTRACTING BIRDS, Alvin M. Peterson, *The Bruce Publishing Co., Milwaukee, 1937. $1.50.*

Anyone who has a plot of land he can call his own will enjoy this book, even if he may not have thus far embarked on the adventure of attracting the "smalle fowles" as Dan Chaucer calls them. The book is simply but enthusiastically written and should accomplish its purpose easily.

THE AMERICAN ILLUSTRATED MEDICAL DICTIONARY, W. A. Newman Dorland, *W. B. Saunders Co., Philadelphia, 1937. Plain $7.00, Thumb Indexed $7.50.*

The seventeenth edition of this classic work boasts of 24 valuable features not all, by any means, found in its predecessors. Thumb-nail portraits of great medical geniuses, brief biographies, indices to many tabulations of correlated facts, an addition of over 5000 new medical terms, and many other helpful features warrant the belief that 'Dorland's' will continue to be the standard handy reference work for years to come.

ANATOMY OF THE FETAL PIG, John G. Sinclair, *Collegiate Press Inc., Ames, Iowa, 1936. $2.00.*

This handy little manual with a spiral wire binding is very fully illustrated, well organized and so cheaply gotten up (in the best sense of the words), that it should help to popularize the use of the fetal pig, not only in embryology courses but also as a mammalian specimen in courses in general or vertebrate anatomy.

ANIMAL BREEDING PLANS, Jay L. Lush, *Collegiate Press Inc., Ames, Iowa, 1937. $3.00.*

This book demonstrates in a very satisfactory fashion how an economic use can be made of a biological science. The book is a practical application of all that cytology and genetics can offer to the animal breeder. As such it should be an excellent text book for agricultural schools and for those animal breeders who are interested in the biological side of their profession.

AUDUBON, Constance Rourke, *Harcourt Brace & Co., New York, 1936. $3.00.*

Much has been made of this work in the book-review sections of the New York Sunday papers, those who are interested may seek for literary criticism there. This reviewer finds, however, special pleasure in recommending this biography to all lovers, followers or professors, of Natural History, as a sympathetic account of the life story of one of America's really great naturalists. Best of all, the scholarship of the author has not asphyxiated the subject. The book is alive.

BEING BORN, Frances Bruce Strain, *D. Appleton-Century Co., New York, 1937. $1.50.*

This is a book for inquisitive preadolescents whose parents are too self-conscious to explain the facts of life. For many a parent the story as given here may be too straight-forward and strong. Better that youngsters should get it so than to get it as so many of us did, crooked and adulterated,—down in the ditch under the corner arc light.

THE BIOLOGICAL CONTROL OF INSECTS, Harvey L. Sweetman, *Comstock Pub. Co., Ithaca, 1936. $3.75.*

This is not an Entomology. It is so much more that we are honestly afraid that it will slip into our library shelves and be tucked away with the entomologies without sufficient notice. It is quite the finest thing on this or any similar subject we have seen in many a year. Somewhere in Don Marquis' inimitable "Archy and Mehitabel" there is this humorous free verse:

"insects are not always
going to be bullied
by humanity
some day they will revolt
i am already organizing
a revolutionary society to be
known as the worms turnverein"

Archy will have to get busy, with books like Sweetman's beginning to appear.

BIOLOGY, U. A. HAUBER AND M. ELLEN O'HANLON, *F. S. Crofts & Co., New York, 1937. $3.90.*

We have had occasion to review the separate sections of this work as they appeared in mimeographed form. Now that the completed volume has appeared in book form there is little to add. It is perhaps sufficient to say that it ought to be in every college library and among the books of every teacher of biology in this country, if only for the purpose of giving the authoritative position of one of the largest and most misrepresented religious bodies in this country on biological questions. In spite of the fact that it is the product of the separate work of a Roman Catholic priest and a Dominican nun, both of them college professors, it will be absolutely illegal and taboo in the Bible Belt. It is decidedly pro-evolution.

BIRDS AROUND THE YEAR, LORINE LETCHER BUTLER, *D. Appleton-Century Co., New York, 1937. $2.00.*

This is the chatty sort of a book which will be welcome not only in public libraries but also among bird-lovers who wish to know more about the habits and peculiarities of the better-known species of this country.

THE BIRDS OF OKLAHOMA, MARGARET MORSE NICE, *University of Oklahoma Press, Norman, 1931. $1.00.*

This work has just come to our reviewing table. Coming as it does from a state which lies directly in the path of many migrating as well as indigenous birds, it is a welcome addition to any ornithological library.

BONES, P. D. F. MURRAY, *The University Press, Cambridge, or Macmillan Co., New York, 1936. $2.50.*

This new little manual of general osteology brings with it from the Strangeways Laboratory at Cambridge many new ideas, and much that is the result of hitherto unpublished research. Not the least valuable feature is a fairly complete bibliography of osteological literature.

CANARY, GUSTAV ECKSTEIN, *Harper & Bros., New York, 1936. $2.50.*

This popular work by the gifted biographer of Noguchi, Hokusai and others, is more than an animal story book. It is an interesting (most reviewers say 'absorbing') study of a room-full of canaries. To a biologist the book may not be tremendously scientific, but then, to a biographer it is probably not very biographical.

CANCER AND DIET, FREDERICK L. HOFFMAN, *Williams and Wilkins Co., Baltimore, 1937. $5.00.*

Here is a challenging book which will have to be taken into account by every one interested in the problem of cancer, its prevalence, cause or cure. Based on questionnaires filled out by some 2,000 cancer patients it offers the rather pertinent evidence that cancer is pretty regularly associated with excessive nutrition, harried or hurried eating, too hot or spicy foods, or foods too modified in processing methods, as opposed to eating slowly of easily digested and eliminated natural food substances. The book proves the relationship between constipation, indigestion, and gastric disorders, with cancerous conditions. It deserves wide attention.

THE CLEAR MIRROR, G. EVELYN HUTCHINSON, *Cambridge University Press, The Macmillan Co., New York, 1936. $2.50.*

A series of papers on life in Goa and Indian Tibet which occasionally comment on biological phenomena, and thereby substantiate the fact that the widely educated traveller sees more than the narrow specialist no matter how highly he may specialize.

COMPARATIVE BIOCHEMISTRY, ERNEST BALDWIN, *Cambridge University Press, The Macmillan Co., New York, 1937. $1.50.*

Based mainly on the Invertebrates, this handy little pocket-volume opens up new lines of thought for newcomers in biochemistry or for those who want to contact the latest ideas on the subject.

CONTRIBUTIONS TO THE ETHNOLOGY OF THE KUTCHIN, CORNELIUS OSGOOD, *Yale University Press, New Haven, 1936. $2.50.*

This fourteenth number in the Yale University Publications in Ethnology, is a careful piece of ethnological research on the Indian Tribes which occupy the headwaters of the Yukon River.

CULTURE METHODS FOR INVERTEBRATE ANIMALS, P. GALTSOFF, F. LUTZ, P. WELCH, AND J. NEEDHAM, *Comstock Publishing Co., Ithaca, 1937. $4.00.*

For the teacher who wants to enliven his classes with living material this new work will come as a veritable Godsend. It is a compendium of methods, advice and information which would take months to accumulate. As such it will inevitably find its way to the shelves of the libraries of all those who really know how to teach biology.

ELECTRICAL SIGNS OF NERVOUS ENERGY, J. ERLANGER AND H. GASSER, *University of Pennsylvania Press, Philadelphia, 1937. $3.50.*

The fourth in the series of the Eldridge Reeves-Johnson Foundation Lectures which were founded to further research in the physical aspects of the medical sciences, is the joint work of two men working at very different institutions. The first author treats of the compound action, physiological characteristics, and reaction to electrical stimulation, of nerve fibers. The second author discusses potential changes and the excitability cycle.

THE EMERGENCE OF HUMAN CULTURE, CARL J. WARDEN, *The Macmillan Co., New York, 1936. $2.00.*

The origin of culture as the turning point where man diverged from his prehistoric ape-like congenitorsis is the theme of this work by a capable Columbia professor who ends his book with a plea for a planned social order.

FIELD GUIDE TO THE BIRDS, ROGER TORY PETERSON, *Houghton Mifflin Co., Boston, 1934. $2.75.*

Here is a real treat in new bird manuals, embodying new features which should make it more than ordinarily popular. Not the least important of these is the system of presenting the bird-figures in corresponding color values instead of the colors themselves. It is handily gotten up in a pocket sized format.

A FRIEND IN THE DARK, RUTH ADAMS KNIGHT, *Grosset & Dunlap, New York, 1937. $1.00.*

A glorious story of the way in which dogs are trained to lead blind people about safely. It is a phase of animal life and training which the average biologist probably knows nothing about, but like an ability to swim, could come in very opportunely if one, or one's friend, should ever have the misfortune of losing the precious gift of sight.

FUNDAMENTALS OF BACTERIOLOGY, MARTIN FROBISHER, *W. B. Saunders Co., Philadelphia, 1917. $3.25.*

Brevity, freshness and clarity characterize this entirely new text which has just been issued. In comparison with most of the bacteriology texts now in use the book looks insignificant, but a careful comparison with standard works shows that very little, if any, important matter has been omitted. It is refreshing to see some really new illustrations for a change.

FUNDAMENTALS OF HUMAN PHYSIOLOGY, J. J. R. MACLEOD, *C. V. Mosby Co., St. Louis, 1936. $8.50.*

This new thin-paper fourth edition of a standard work contains a surprising amount of physiological information in a very small compass. It is perhaps the most complete general text on the subject we have yet seen.

GARDENING ON NOTHING A YEAR, MARY S. GRIFFITH, *Hale Cushman & Flint, Boston, 1937. $1.75.*

At last we have a gay, humorous, and sometimes caustic book on gardening. So much solemn nonsense has been appearing in recent years on the perennial subject that it is refreshing to find someone to whom gardening is a pastime of vast recreative possibilities, rather than an intellectual gymnastic solemnized by technical terminology.

THE GENUS HEUCHERA, C. O. ROSENDAHL, F. K. BUTTERS AND OLGA LAKELA, *The University of Minnesota Press, Minneapolis, 1936.*

This monograph on an interesting group of perennial herbs is very carefully gotten together and should prove a valuable taxonomic aid to those whose work brings them into frequent contact with the Saxigrages.

GROW THEM INDOORS, ALLEN H. WOOD JR., *Hale Cushman & Flint, Boston, 1936. $1.75.*

This is a very stimulating book for people who have botanical leanings and need someone to suggest a cheering, and time-consuming hobby, not, of course, that others will not find it either useful or profitable.

HARDY CALIFORNIANS, LESTER ROWNTREE, *The Macmillan Co., New York, 1936. $3.50.*

I presume that those who are led to experiment with hardy Californian flowering plants and shrubs will have to inquire of the author at her home in Carmel Highlands, California, for information as to where the forms she so attractively describes and pictures may be obtained. It is sufficient to say that many a middle westerner, and not a few easterners are going to be intrigued by the possibility of introducing some of the, to us at least, exotic western types.

HOW TO KNOW THE INSECTS, H. E. JACQUES, *Published by the Author, Mt. Pleasant, Iowa, 1936. In paper $1.00, in cloth $1.80.*

Here is a handy little manual that should be to entomology what Gray or Britten & Brown are to plant classification. Although planographed and in fairly small type, nearly every form mentioned in the key is well and clearly illustrated. Directions for collecting, preserving and mounting specimens are unusually well presented. All in all, it should be an invaluable adjunct for a beginning course.

THE HUMAN MACHINE, JOHN YERBURY DENT, *Alfred A. Knopf, New York, 1937. $2.50.*

The scientist or layman who has no time for the "metaphysical" or its advocates will like this very mechanistic Englishman's book so highly recommended by that other great English thinker, H. G. Wells. The book is evidently a counterblast against Alexis Carrel's best seller, "Man, the Unknown," but the present work, no matter how much it may bolster the faith of the mechanists, suffers from the comparative unimportance of its author.

THE INSECT MAN, ELEANOR DOORLY, *D. Appleton-Century Co., New York, 1937. $1.50.*

This is a surprising book. Written for children, it will probably be just as delightful to grown-ups. It is hard to describe. Perhaps saying that it is a combination of the best type of natural history tales built around the life and character of Jean Henri Fabre by three children almost as interesting as the inimitable Abbe youngsters, comes as close to being the truth as any mere reviewer can see it.

INTRODUCTION TO HISTORICAL GEOLOGY, WILLIAM J. MILLER, *D. Van Nostrand Co., New York, 1937. $3.25.*

The fourth edition of Miller's well known and favorably received manual will ably maintain the author's well-deserved reputation. The profusion of really excellent illustrative material adds to the usefulness of the book.

INTRODUCTION TO MEDICAL SCIENCE, WILLIAM BOYD, *Lea & Febiger, Philadelphia, 1937. $3.50.*

Here is a very desirable book for the general library, affording as it does a rather comprehensive survey of human disease designed for the average layman's understanding. It is not too technical, and should bring about on the part of those who read it more intelligent cooperation with the medical profession. If it has one fault it is that the book is too inconspicuous both in format and size. It will never carry the conviction to the dumb-john in the street that the old-fashioned "doctor book" with its lurid and morbid illustrations did. Which is to say that this book is honestly scientific.

THE LEICA MANUAL, W. MORGAN AND H. LESTER, *Published by Morgan & Lester, 100 E. 42nd St., New York.*

The owners of Leica or any other standard brands of small-film cameras will find this very comprehensive manual a mine of useful information, covering as it does almost every conceivable photographic situation from astronomical or candid photographing of the subject all the way up to converting the picture into a mural decoration. About the only field we could wish for more adequate treatment to complete the book is in the province of microphotography where the camera and microscope are used together.

THE LIVING WORLD, SAMUEL H. WILLIAMS, *The Macmillan Co., New York, 1937. $3.60.*

As a stimulating source book for teachers in any phase of elementary biology, including college freshman courses, this book is to be recommended. However, this is not its main purpose. It was originally intended as a textbook for a general course in nature. As such it should have much to offer. So also would its use be indicated in general survey courses, or courses in field biology or elementary ecology. At any rate, the instructor with this book on his shelves will not lack for those interesting details which help to fill out the student's understanding, or quicken his interest in biological problems.

MANUAL OF NORMAL HISTOLOGY AND ORGANOGRAPHY, CHARLES HILL, *W. B. Saunders Co., Philadelphia, 1937. $3.50.*

This seventh revised edition of a well known text improves upon its predecessors in bringing up to date the information on all the newer discoveries, particularly endocrinology.

THE METABOLISM OF LIVING TISSUES, ERIC HOLMES, *Cambridge University Press, London; Macmillan Co., New York, 1937. $2.25.*

"Unusual" is the word that has been applied to this work advisedly. The author dynamically views the metabolic changes that go on in living tissues, rather than to discuss the chemical results of the action and reactions. As such, the viewpoint is fresh and stimulating. This handy little volume will be helpful wherever biochemistry is studied.

MINNOWS OF MICHIGAN, C. L. HUBBS AND G. P. COOPER, *Cranbrook Institute of Science, Bloomfield Hills, Mich., 1936. $0.50.*

This carefully prepared and well-edited paper-bound booklet will be valuable particularly to the zoologists in the states bordering Michigan.

MONKEYS, ROSE FYLEMAN, *Thomas Nelson & Sons, New York, 1936. $1.00.*

This volume was originally written for children. Since it fairly well covers the entire monkey group, it forms a more than ordinarily interesting series of chapters on the monkey fauna of various parts of the globe, together with many of the behavioristic differentiations or likenesses within groups.

MONOGRAPHIC STUDY OF THE RED CROSSBILL, LUDLOW GRISCOM, *Boston Society of Natural History, Boston, 1937. $1.60.*

This recent issue of the Proceedings of the Boston Society of Natural History recognizes at least twenty-four geographic varieties or subspecies pointing rather definitely to the invariable correlation between variety of form and diversity of environment. It is a careful piece of work that has long needed doing.

MORE SIMPLE SCIENCE, JULIAN HIXLEY AND E. N. DA C. ANDRADE, *Harper and Brothers, New York, 1936. $2.50.*

This sequel to the same authors "Simple Science" supplies much additional material to that which was offered in the original volume, particularly in the fields of geology and agriculture. Popular books like this are a boon to the busy layman who wants to keep abreast of scientific developments on the one hand, on the other such books serve as a very desirable stimulus to set the feet of wide-awake young people on the way of scientific careers.

NATURE OF GROWTH, F. S. HAMMETT, *Published by the Author, Provincetown, Mass., 1937.*

An original essay in 306 numbered paragraphs, totally without punctuation, of which the following is a fairly typical example:—306 Long words are short cuts to be used by others than lexicographers—and nuance of meaning is not obtained by that limited vocabulary which those of meagre education would wish all papers to be written in.

THE NATURE AND PROPERTIES OF SOILS, T. L. LYON & H. O. BUCKMAN, *The Macmillan Co., New York, 1937. $3.50.*

Of all the laboratory manuals or content texts on soil science which this reviewer has come across in the last three years this present volume seems the best organized and the most practical. Most text-books, like Shakespeare's lady, "protest too much." This one seems to have hit the happy medium between the maximum of confusing detail and the minimum of a sketchy outline. It ought to be useful, and therefore, most probably, popular.

NEW ENGLAND HERBS, S. N. F. SANFORD, *New England Museum of Natural History, Boston, 1936. $0.30.*

This handy little pamphlet gives an entirely adequate treatment of herbs used as medicines, foods, beverages, flavorings and as ornaments. One would wish that both the book and the herbs it treats of were in every American housewife's pantry. There is no question that there would be more contented homes if more wives found this very straight way into the hearts of their husbands.

NORTHLAND FOOTPRINTS, KENNETH CONIBEAR, *Charles Scribner's Sons, New York, 1937. $2.50.*

Charmingly anthropomorphic stories of the adventures of a group of untamed denizens of the primitive forest, both before and after the coming of man, make up this attractive book.

OCTOBER FARM, WILLIAM BREWSTER, *Harvard University Press, Cambridge, (Mass.), 1936. $2.50.*

Excerpts from the diaries and the Concord journals of the great American ornithologist, William Brewster, make up this attractive book which has received so much favorable publicity since its appearance. There is an undeniably personal flavor about the daily jottings in their references to the author's experiences, his observations of the comings and goings of the birds, the minor tragedies of the woods, the farm and the roadside. The book deserves all the credit it gets. Somehow or other it is reassuring to know that there are spots here and there about, near or in even the most densely populated portions of the country where sympathetic minds are watching, enjoying and recording the daily happenings in Nature.

OUR NATURAL RESOURCES AND THEIR CONSERVATION, A. E. PARKINS AND J. R. WHITTAKER, *John Wiley & Sons, New York, 1936. $4.00.*

The editors of this book have done an excellent job. The twenty-three topics which have been discussed by as many separate authors are well chosen, distinctly different enough so that there is little, if any, noticeable repetition. Of utmost importance as a reference work in all libraries, the book is primarily intended as a text for courses in conservation. It is to be hoped that the colleges and universities of the land will adopt this or some kindred text as the basis of a course which along with our other required cultural courses will help to form an educated body of intelligent opinion on this most essential phase of our national existence.

THE PATIENT AND THE WEATHER, WILLIAM F. PETERSON, *Edwards Brothers, Ann Arbor, Mich., 1935, 1936. $24.25.*

The four large books included in this set are titled as follows: Vol. I, Part 1, "The Footprint of Asclepius;" Vol. I, Part 2, "Autonomic Integration;" Vol. II, "Autonomic Disintegration;" and Vol. III, "Mental and Nervous Diseases." The whole comprises a stimulating series of monographs dealing with the effects of meteorological forces on normal people and mental or physical patients. It is an interesting and not altogether new viewpoint of the work of medical profession that Dr. Peterson champions. If these volumes ever fall into the hands of California, Arizona or New Mexico chambers of commerce we shall most certainly have new material for the realtors' chamber of advertising horrors, as it would seem that those regions are climatically the best for human existence,—whatever may be said for the meteorologically bedevilled rest of the U. S. A. as a stimulus to development and endurance.

PHYSIOLOGICAL CHEMISTRY, J. F. MCCLENDON AND C. J. V. PETTIBONE, *C. V. Mosby Co., St. Louis, 1936. $3.50.*

Not nearly as heavy or ponderous as some physiological chemistries we have seen, this eminently usable text enters its sixth edition auspiciously with three entirely new chapters, those on Enzymes, Energy Exchange and Internal Secretions. The latter part of the book is devoted to a 100 page laboratory manual. A complete and practical glossary is likewise provided.

PHYSIOLOGY OF THE ELEPHANT, FRANCIS G. BENEDICT, *Carnegie Institution, Washington, 1935. Paper, $2.25, Cloth, $3.00.*

Coming from the Nutrition Laboratory of the Carnegie Institution of Washington, this paper is characterized by the meticulous accuracy of detail one comes to associate with the publications of the Institution. The paper covers a wide field in the physiology of the animal. In addition to the metabolic phenomena and the methods used to accumulate them, there is a wealth of other detail covering life habits, temperamental variations, and breeding habits,—about all of which there is still current a lot of misinformation.

THE POND BOOK, W. PORTER AND E. HANSEN, *American Book Co., Chicago, 1936. $0.88.*

A popular and handy little volume which quite inclusively covers the ecology of the fresh-water pond, designed for grade-school students,—this book should be familiar to every biology student who plans to enter the teaching fields.

A PRACTICAL MEDICAL DICTIONARY, THOMAS L. STEDMAN, *William Wood & Co., Baltimore, 1936. Without index, $7.00; with thumb index, $7.50.*

The thirteenth edition of a standard medical reference work which first appeared on the scene twenty-five years ago, is particularly handy because of a very intelligent and practical introduction which includes an extensive, yet readily workable, section on medical etymology. A comprehensive list of medical prefixes, and another of suffixes in common use gives a valuable start for the understanding of a large number of medical terms without extended attention to the dictionary. The book is well edited, not overly supplied with illustrations, and contains as an added feature an alphabetical list of the 217 various tables scattered through the work.

THE PRINCIPLES OF HEREDITY, L. H. SNYDER, *D. C. Heath and Co., New York, 1935. $3.00.*

This new text is primarily designed for a semester course in introductory genetics. It is well organized, has a wealth of aptly chosen illustrations, two pages of them in color. The use of human material and statistics wherever possible should help to focus and hold the attention of the student.

RECENT ADVANCES IN CYTOLOGY, C. D. DARLINGTON, *P. Blakiston's Son & Co., Inc., Philadelphia, 1937.*

This second edition of a much discussed, and once upon a time much controverted, textbook of cytology is bound to be viewed with more than passing interest in this country, especially since it is the work of an Englishman being published in this country. The very fact that the author seems willing to employ the deductive method in his predictions is going to upset some biologists. The introduction by J. B. S. Haldane anticipates this. A noticeable novelty is the large number of photomicrographs to illustrate it.

ROADS TO HEALTH AND HAPPINESS, OSCAR C. MUELLER, *Prentice-Hall, Inc., 1936. $2.00.*

Practically every book publisher tries to put at least one book in every popular field of interest on the market. This is the Prentice-Hall contribution in the field of general mental and physical hygiene. It is not a text-book. It is a handy little volume of most sane and constructive advice. As such it is about the best we have yet to review. It would be a splendid present for your 'ailing' aunt.

SEVEN SEALS OF SCIENCE, JOSEPH MAYER, *D. Appleton-Century Co., New York, 1937. $3.00.*

This is a revised students' edition of the earlier work by the same title. It is a popular history of science by an economist and sociologist. The author has not gone very exhaustively into his sources, as the highly improbable stories of Bruno and Galileo demonstrate. However, it is a generally popular work which should form the basis of an interesting survey course on the development of science.

SNAKES AND THEIR WAYS, C. H. CURRAN, AND CARL KAUFFELD, *Harper and Brothers, New York, 1937. $3.50.*

A new book on natural history which fills a need in our herpetological literature. Designed for a general appeal, it will probably be more popular in public than in college libraries. There is a check list of some 193 world varieties, but there are very few if any general references, and none specific. There are 62 excellent half-tones grouped together in the center of the volume, which makes them rather easy to find. The book should prove fascinating to the interested layman.

SNAKES OF MARYLAND, HOWARD A. KELLY, *Natural Hitory Society of Maryland, Baltimore, 1936. $0.60.*

This is unquestionably the most elaborate and beautiful monograph that has apeared in zoological fields this year. It is evidently a labor of love in a field of science. It overflows with excellent photographs, several of them in colors. There is also a handy key to the non-venomous snakes, another for the venomous and a third for the immature forms. Being bound in paper it sells so reasonably that it should have a wide appeal. Purchasers will want to have it more substantially bound for permanent reference.

STRANGE INSECTS AND THEIR STORIES, A. HYATT VERRILL, *L. C. Page & Co., Boston, 1937. $2.50.*

Here are popular stories of the appearance, behaviour and relationships of insects from all over the world. The book is well supplied with illustrations, some in color. It has a serviceable index but no list of references consulted, so one is at a loss to decide how much of the data is scientifically reliable.

STUDENTS OUTLINE SERIES: *Botany*, L. E. YOCUM, *Zoology*, R. T. HANCE, *Longmans Green and Co., New York, 1937. $0.75 each.*

Who has not run into the famous SOS manuals in college? While the SOS stands for "Students Outline Series," there is a maritime application of this combination of initial letters which may be even more appropriate. At any rate both of the volumes here announced are valuable handbooks, either as handy compends for quick review, or as outlines about which to build a course. Another useful purpose which they might easily serve would be as a basis for quiz sections. They really must be seen to be appreciated.

SYPHILIS SIVE MORBUS HUMANUS, CHARLES S. BUTLER, *Brooklyn, 1936.*

Originally published by the Science Press, at Lancaster, Pa., this well printed, illustrated, and thoroughly referenced volume was evidently intended for private circulation. It is, in view of the American Medical Association's drive on social diseases, lamentable that the book will not have wider circulation and appeal. The illustrations constitute an effectively morbid chamber of horrors. Incidentally, the book is in excellent, racy and very up-to-date English, even though the use of the ancient title for the disease might lead to a misunderstanding on that score. The author is a widely informed Rear Admiral in the Medical Corps of the U. S. Navy.

TEXTBOOK OF BACTERIOLOGY, C. M. HILLIARD, *Ginn and Co., Boston, 1936. $3.50.*

This bacteriological text is a revision of the author's earlier book, and is based on a general, instead of the usual medical approach to the subject. As such it should be particularly applicable to agricultural and economic applications of the bacteriological science.

TEXTBOOK OF HISTOLOGY, JOSEPH KRAFKA, *Williams and Wilkins Co., Baltimore, 1936.*

This is no guide-book in the preparation of histological specimens for study, nor is it a study of pathological specimens. It is a well organized series of progressive chapters from the primary germ layers to the fully developed brain. As an adjunct to other than medical courses, particularly comparative anatomy, this text should prove most satisfactory. It correlates with other zoological studies much better than most histological works we have yet seen.

TEXTBOOK OF ORGANIC CHEMISTRY, Hugh C. Muldoon, *P. Blakiston's Son & Co., Philadelphia, 1936. $3.00.*

This well-gotten up text offers very clear explanations of the fundamental reactions of organic chemistry. Although it uses the older method of introducing the student to his subject by beginning with the hydrocarbons, it should serve very well as a full year text for a premedical course. The frequent use of compounds having medicinal value emphasizes the importance of the subject in preparation for subsequent work. The interesting relationship between the hormones and the vitamins is given a special chapter on biological compounds. The questions at the end of chapters help the student correlate the matter thus far covered.

TEXTBOOK OF PHYSIOLOGY, W. D. Zoethout, *C. V. Mosby Co., St. Louis, 1935. $4.00.*

This is the fifth edition of a well-known text for short courses in physiology such as are common in dental, pharmacal and normal schools. This revision brings up to date the discussions on hormones, vitamins, muscle physiology and the nervous system. There has been a very desirable transfer of much helpful but not altogether important matter to smaller type, thus compressing the size of the book but not eliminating it altogether.

THREE THOUSAND MYCOLOGICAL TERMS, Walter H. Snell, *Rhode Island Botanical Club, Providence, 1936. $2.00.*

This handy dictionary of terminology will be appreciated by any one working with or interested in the fungi. It is clear, concise and accurate. What more could be expected or needed for quick reference?

WEATHER RAMBLES, W. J. Humphreys, *The Williams & Wilkins Co., Baltimore, 1937. $2.50.*

Chock full of all sorts of meteorological lore, this book by the collaborating meteorological physicist of the U. S. Weather Bureau, is not only entertaining, but also informative. There is no better subject, some psychologists tell us, for conversation than the weather, since it is something no one escapes. Here is subject matter for weather conversation of an extremely high order,—not in platitudinous theory, but in absorbingly human interest.

THE WILD GARDEN, Margaret McKenny, *Doubleday Doran & Co., Inc., Garden City, 1936. $1.00.*

Special gardens came in with the rock-gardening craze. A rock-garden, however, has always looked to us like a junk pile left out in the sun and dignified by the name "garden" because a few dejected little plants tried to eke out an existence there. With a wild-flower garden it is different. Here one tries to transplant a bit of the far away out-of-doors as naturally as possible to the home grounds. This will be more successfully accomplished under the guidance of such a book as Miss McKenny's "Wild Garden." It is most helpfully arranged, with chapters set apart for each type of possible habitat.

THE WINDOW GARDEN, B. R. Buxton, *Orange Judd Publishing Co., New York, 1936. $1.50.*

The grand old indoor sport of our grandmothers is coming back, not necessarily as a part of the recrudescence of the Mid-Victorian styles of interior decoration, but for the fun, interest and experience to be gotten out of it. This is a very helpful adjunct for the devotee of the house plant. It will be appreciated by all those so interested.

THE WORLD OF SCIENCE, F. Sherwood Taylor, *Reynal and Hitchcock, New York, 1937. $3.75.*

One look at the title of this fat volume and the word "compend" irresistibly comes to mind, and with reason. It covers a wide range of subjects from the states of matter to the evolution of life. Written in an easy and informal style, it is copiously illustrated with photographs, diagrams and sketches, constituting, in effect, an encyclopedia of science. Considering the price asked the book should be a valuable and popular addition to grade and high school libraries.

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